

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

**ТЕРНОПІЛЬСЬКИЙ НАЦІОНАЛЬНИЙ
ТЕХНІЧНИЙ УНІВЕРСИТЕТ ІМЕНІ ІВАНА ПУЛЮЯ**

*Кафедра української та
іноземних мов*

Методичні вказівки з англійської мови

Тернопіль

2016

Методичні вказівки з англійської мови для студентів I – II курсів напряму підготовки "Обладнання і технології харчових виробництв" /уклад. С.А.Федак, І.Р.Вовк. - Тернопіль: ТНТУ імені Івана Пулюя, Вектор.- 2016 .-28с.

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Методичні вказівки розглянуті і затверджені на засіданні кафедри української та іноземних мов Тернопільського національного технічного університету імені Івана Пулюя.

Протокол № 6 від 21 лютого 2016 р.

Схвалено і рекомендовано до друку методичною радою факультету по роботі з іноземними студентами Тернопільського національного технічного університету імені Івана Пулюя.

Протокол №7 від 6 березня 2016 р.

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ПЕРЕДМОВА

Методичні вказівки призначені для студентів напрямку підготовки ‘Обладнання і технології харчових виробництв’. У методичних вказівках зібрано спеціалізовані тексти з оригінальної англомовної літератури та сучасних електронних джерел. Матеріали, вміщені у книжці, стосуються основних понять зі спеціальності студентів, містять слова та вирази, найчастіше вживані у фаховій літературі, яка стосується обладнання і технологій харчових виробництв.

Посібник містить десять змістових розділів. Текстам передують вправи, спрямовані на опрацювання та засвоєння нового вокабуляру, зокрема термінів та їх визначень, що, у свою чергу, полегшує подальшу роботу над текстом. Матеріали для читання містять автентичні вирази і слова, вживані у згаданій сфері професійного спілкування.

Післятекстові вправи спрямовані на перевірку розуміння прочитаного та його обговорення. Також у методичних вказівках уміщено завдання на засвоєння та активізацію нової лексики.

UNIT 1. Food manufacture

Essential vocabulary

package – упаковка	two-tier structure – дво-ва структура
technique – метод	wide – широкий
preservation – збереження	sophisticated – складний
involve – залучати	distribution – розподіл
salting – соління	enhance – підвищення
curing – лікування	reduce costs – скорочувати витрати
curdling – згортати	define – визначені
drying – сушіння	eliminate – сувати, ліквідувати
pickling – маринування	impact – вплив
development – розвиток	point – точка
agrochemicals – агрохімікати	
advantages – переваги	

1. Match the words and definitions

Microwave	1.person who works with meat;
Computer-based control systems	2.automated system based on integrated use of technical, mathematical, information and organizational tools to manage complex technical and economic objects;
Butcher	3.is based on non-ionizing microwave radiation;
Vegetable growing	4.light industry, the totality of food production in finished form;
Food industry	5.processes, primarily marine and oceanic fish, and partly - the river;
Fish industry	6. agriculture, which has been producing vegetable and melon production, development and improvement

	of technologies of growing vegetables and melons;
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2. Read and translate the text:

Food manufacture

Packaged foods are manufactured outside the home for purchase. This can be as simple as a butcher preparing meat or as a modern international food industry. Early food processing techniques were limited by available food preservation, packaging and transportation. This mainly involved salting, curing, drying, pickling, fermentation and smoking. Food manufacturing arose during the industrial revolution in the 19th century. This development took advantage of new mass markets and emerging new technology, such as milling, preservation, packaging and labeling and transportation. It brought the advantages of pre-prepared time saving food to the bulk of ordinary people who did not employ domestic servants. At the start of the 21st century a two-tier structure has arisen, with a few international food processing giants controlling a wide range of well-known food brands. There also exists a wide array of small local or national food processing companies. Advanced technologies have also come to change food manufacture. Computer-based control systems, sophisticated processing and packaging methods, and logistics and distribution advances, can enhance product quality, improve food safety, and reduce costs.

Sophisticated technologies define modern food production. They include many areas. Agricultural machinery, originally led by the tractor, has practically eliminated human labor in many areas of production. Biotechnology is driving much change, in areas as diverse as agrochemicals, plant breeding and food processing. Many other areas of technology are also involved, to the point where it is hard to find an area that does not have a direct impact on the food industry. Computer technology is also a central force, with computer networks and specialized software providing the support infrastructure to allow global movement of components involved.

3. Answer the questions:

1. What were the early methods of food processing?

2. When did food production and processing arise?
3. When did a two-tier production start?
4. What can improve the quality of products?
5. What determines modern production?
6. What do you know about technologies of food industry?
7. What aroused after technology revolution in the 19th century?
8. What is the role of computer technologies in food manufacture?

4. Fill in the words from the list:

define, limited, breeding, include, exists, central force, outside, mainly, come, two-tier structure, well-known, involved

1. Packaged foods are manufactured ... the home for purchase.
2. Early food processing techniques were ... by available food preservation, packaging and transportation
3. There also ... a wide array of small local or national food processing companies.
4. At the start of the 21st century a ... has arisen, with a few international food processing giants controlling a wide range of ... food brands.
5. This ... involved salting, curing, drying, pickling, fermentation and smoking.
6. Advanced technologies have also ... to change food manufacture
7. Sophisticated technologies ... modern food production.
8. They ... many areas
9. Biotechnology is driving much change, in areas as diverse as agrochemicals, plant ... and food processing
10. Computer technology is also a ..., with computer networks and specialized software providing the support infrastructure to allow global movement of components

UNIT 2. Cooking equipment and methods

Essential vocabulary

oven – піч, духовка, сушильна піч

baking – випікання, випікання, випалювання, гаряче сушіння

roasting – смаження, випал, прожарювання

dry-heat cooking – приготування на пару

cuisine – кухня

non-radiant heat ovens – печі непроменевого тепла

microwave oven – мікрохвильова піч

cooktop – варильна печі

steaming – пропарювання

simmering – киплячий,

boiling – кип'ятіння

radiant heat source – променисте джерело тепла

vessel – посуд, начиння

frying pan – сковорідка

conventional ovens, – звичайні печі

1. Match the words and definitions

Cuisine	1. frying food
Convection	2. place for preparing meals
Frying pan	3. transfer liquid to vapor
Boiling	4. heat transfer in liquids
Grill	5. cooking by thermal radiation

2. Read and translate the text:

Cooking equipment and methods

Many types of equipment are used for cooking. Ovens can be used for baking or roasting and offer a dry-heat cooking method. Different cuisines will use

different types of ovens, for example Indian culture uses a Tandoor oven is a cylindrical clay oven which operates at a single high temperature, while western kitchens will use variable temperature convection ovens, conventional ovens, toaster ovens in addition to non-radiant heat ovens like the microwave oven. Ovens may be wood-fired, coal-fired, gas, electric, or oil-fired.

Various types of cook-tops are used as well. They carry the same variations of fuel types as the ovens mentioned above. Cook-tops are used to heat vessels placed on top of the heat source, such as a sauté pan, sauce pot, frying pan, pressure cooker, etc. These pieces of equipment can use either a moist or dry cooking method and include methods such as steaming, simmering, boiling, and poaching for moist methods; while the dry methods include sautéing, pan frying, or deep-frying.

In addition, many cultures use grills for cooking. A grill operates with a radiant heat source from below, usually covered with a metal grid and sometimes a cover. An open pit barbecue in the American south is one example along with the American style outdoor grill fueled by wood, liquid propane or charcoal along with soaked wood chips for smoking. A Mexican style of barbecue is called barbacoa, which involves the cooking of meats and whole sheep over open fire. In Argentina, asado is prepared on a grill held over an open pit or fire made upon the ground, on which a whole animal is grilled or in other cases smaller cuts of the animal.

3. Answer the questions:

1. What ovens can be used for?
2. Which type of oven is used in Indian cuisine?
3. Which types of oven may be used in cuisines?
4. What is a Mexican style of barbecue?
5. What is the way of preparing asado in Argentina?
6. Which pieces of equipment can use either a moist or dry cooking method?
7. Which cooking methods does it include?
8. What things grill cooperates with?

9. What do dry methods include?
10. What is the aim of using ovens?

4. Fill in the words from list:

Heat, equipment, a moist, cuisines, oven, oil-fired, grills, radiant heat source, propane, asado

1. Many types of ... are used for cooking.
2. Different... will use different types of ovens, for example Indian culture uses a Tandoor oven is a cylindrical clay ... which operates at a single high temperature.
3. 3. Ovens may be wood – fired, coal – fired, gas, electric, or
4. Cooktops are used to ... vessels placed on top of the heat source, such as a sauté pan, sauce pot, frying pan, pressure cooker, etc.
5. These pieces of equipment can use either ... or dry cooking method and include methods such as steaming, simmering, boiling, and poaching for moist methods; while the dry methods include sautéing, pan frying, or deep – frying.
6. In addition, many cultures use ... for cooking.
7. A grill operates with a ... from below, usually covered with a metal grid and sometimes a cover.
8. An open bit barbecue in the American south is one example of outdoor grill fuelled by wood, liquid ... or charcoal along with soaked wood chips for smoking.
9. In Argentina, ... is prepared on a grill held over an open pit or fire made upon the ground, on which a whole animal is grilled or in other cases smaller cuts of the animal.

UNIT 3. Ignition

Essential vocabulary

thermocouple – термопара
 spark – іскра
 electric – електричний
 gas stove – газова плита
 flame – полум'я
 explosion – вибух
 pressure – тиск
 burner – пальник
 signal – сигнал
 pilot flame – запальне полум'я
 ignition – запалювання
 stove – піч
 safety valve – запобіжний клапан
 power source – джерело живлення

1. Match the words and definitions

spark	1. the force per unit area applied in a direction perpendicular to the surface of an object.
flame	2. rapid increase in volume and release of energy in an extreme manner, usually with the generation of high temperatures and the release of gases
pressure	3. short-term intensive fire a limited volume of gas mixture over the surface of a combustible substance
ignition	4. device that regulates, directs or controls the flow of a fluid (gases, liquids, fluidized solids, or slurries) by opening, closing, or partially obstructing various passageways
stove	5. thermally insulated chamber used for

valve	the heating, baking or drying of a substance
explosion	6. device for initiating explosives 7. the visible (light-emitting), gaseous part of a fire. It is caused by a highly exothermic reaction taking place in a thin zone

2. Read and translate the text:

Ignition

Gas stoves today use two basic types of ignition sources, standing pilot and electric. A stove with a standing pilot has a small, continuously burning gas flame (called a pilot flame) under the cooktop. The flame is between the front and back burners. When the stove is turned on, this flame lights the gas flowing out of the burners. The advantage of the standing pilot system is that it is simple and completely independent of any outside power source. A minor drawback is that the flames continuously consume fuel even when the stove is not in use. Early gas ovens did not have a pilot. One had to light these manually with a match. If one accidentally left the gas on with the oven door closed, gas would fill the oven and eventually the room. A small spark, such as an arc from a light switch being turned on, could ignite the gas, triggering a violent explosion. To prevent these types of accidents, oven manufacturers developed and installed a safety valve in the oven. The safety valve uses a pilot flame to ignite the main burner when the oven is turned on. The pilot flame heats a thermocouple that sends a signal to the valve to stay open. If a draft blows out the pilot flame or it goes out due to loss of gas pressure, the thermocouple cools and signals the valve to close, shutting off the gas to the oven.

4. Answer the questions:

1. How many types of ignition sources do gas stoves use today?
2. Which two basic types of ignition sources do gas stoves use today?
3. A stove with a standing pilot has a small, continuously burning gas flame (called a pilot flame) under the cooktop, don't they?

4. Where is the flame?
5. When does this flame light the gas flowing out of the burners?
6. Why the safety valve does a pilot flame use?
7. How does the safety valve work?
8. Why did the safety valve install in the oven?
9. What is a minor drawback of standing pilot?
10. What is the advantage of the standing pilot system?

4. Fill in the words from the list:

shutting off, with, when, did, under, uses, thermocouple, turned on, oven, would

1. A stove with a standing pilot has a small, continuously burning gas flame (called a pilot flame) the cooktop.
2. If a draft blows out the pilot flame or it goes out due to loss of gas pressure, the thermocouple cools and signals the valve to close, the gas to the oven.
3. The pilot flame heats a that sends a signal to the valve to stay open.
4. The safety valve a pilot flame to ignite the main burner when the oven is turned on.
5. To prevent these types of accidents, manufacturers developed and installed a safety valve in the oven.
6. A small spark, such as an arc from a light switch being , could ignite the gas, triggering a violent explosion.
7. If one accidentally left the gas on with the oven door closed, gas fill the oven and eventually the room.
8. A minor drawback is that the flames continuously consume fuel even the stove is not in use.
9. Early gas ovens not have a pilot.
10. One had to light these manually a match.

UNIT 4: Food dehydrator

Essential vocabulary

moisture – вологість

tray – лоток

constant – постійний

moist air – вологе повітря

heating element – нагрівальний елемент

air vent – вентиляційний отвір

foods – продукти

pathogens – патогени

dried – висушений

shelf life – термін придатності

bacteria – бактерії

dehydrator – осушувач

circulation – циркуляція

fan – вентилятор

flow – потік

1. Match the words and definitions

Constant	a) term for the amount of water vapor in the air
Circulation	b) machine used to create flow within a fluid, typically a gas such as air.
Moisture	c) continuous movement of the masses
Pathogens	d) microbe or microorganism such as a virus, bacterium, prion, or fungus that causes disease in its animal or plant host
Air	e) large-scale movement of air, and the means
Flow	f) layer of gases surrounding the planet Earth that is retained by Earth's gravity

Fan	g) non-varying value, i.e. completely fixed or fixed in the context of use
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2. Read and translate the text:

Food dehydrator

Food dehydrator is an appliance that removes moisture from food to aid in its preservation. A food dehydrator uses heat and air flow to reduce the water content of foods. The water content of food is usually very high, typically 80% to 95% for various fruits and vegetables and 50% to 75% for various meats. Removing moisture from food restrains various bacteria from growing and spoiling food. Further, removing moisture from food dramatically reduces the weight of the food. Thus, food dehydrators are used to preserve and extend the shelf life of various foods.

A food dehydrator's basic parts usually consist of a heating element, a fan, air vents allowing for air circulation and food trays to lay food upon. A dehydrator's heating element, fans and vents simultaneously work to remove moisture from food. A dehydrator's heating element warms the food causing its moisture to be released from its interior. The appliance's fan then blows the warm, moist air out of the appliance via the air vents. This process continues for hours until the food is dried to a substantially lower water content, usually fifteen to twenty percent or less.

Most foods are dehydrated at temperatures of 130 degrees Fahrenheit, or 54 degrees Celsius, although meats being made into jerky should be dehydrated at a higher temperature of 155 degrees Fahrenheit, or 68 degrees Celsius, or preheated to those temperature levels, to guard against pathogens that may be in the meat. The key to successful food dehydration is the application of a constant temperature and adequate air flow. Too high of a temperature can cause case hardened foods; food that is hard and dry on the outside but moist on the inside.

The first food dehydrator was sold in 1920.

Solar dryers use solar energy to create a flow of warm air through the tray.

3. Answer the questions:

- 1) What does food dehydrator make?
- 2) Which is the water content of food?
- 3) What does various bacteria restrain from growing and spoiling food?
- 4) By which temperature meats being made into jerky?
- 5) When was the first food dehydrator sold?
- 6) What can cause too high of a temperature?
- 7) What is The key to successful food dehydration?
- 8) How long does This process continue?
- 9) Of which basic parts does a food dehydrator usually consist?
- 10) Why are food dehydrators used?

4. Fill in the words from the list:

through, is, to, sold, usually, from, can, consist, for, reduce:

- 1) Removing moisture food restrains various bacteria from growing and spoiling food.
- 2) A food dehydrator's basic parts usually of a heating element, a fan, air vents allowing for air circulation and food trays to lay food upon.
- 3) This process continues hours until the food is dried to a substantially lower water content, usually fifteen to twenty percent or less.
- 4) Solar dryers use solar energy to create a flow of warm air the tray.
- 5) The key to successful food dehydration the application of a constant temperature and adequate air flow
- 6) A food dehydrator uses heat and air flow to the water content of foods.
- 7) Food dehydrator is an appliance that removes moisture from food aid in its preservation.

8) The first food dehydrator was in 1920.

9) Too high of a temperature cause case hardened foods; food that is hard and dry on the outside but moist on the inside.

10) The water content of food is very high, typically 80% to 95% for various fruits and vegetables and 50% to 75% for various meats.

UNIT 5: Meat mincer

Essential vocabulary

meat mincer

appliance

raw

fineness

breadcrumbs

disassembled

grind

hygiene

requirement

beef

pork

additive

salt

spice

taste

appearance

1. Match the words and definitions

Meat mincer	a) taste aromatic substances;
Beef	b) an electric appliance for fast cooking and heating food;
Microwave	c) a component of the mixture;
Spices	d) an electrical device for food storage;
Sausage	e) a special device for grinding meat;
Ingredient	f) a foodstuff produced from meat;
Refrigerator	g) a meat of cattle;

2. Read and translate the text:

Meat mincer

A meat grinder or meat mincer is a kitchen appliance for grinding, fine mincing or mixing raw or cooked meat, fish, vegetables or similar food. It replaces tools like the mincing knife, for example, which has been used to produce minced meat, filling etc. The producer puts the minced food into a funnel, which is placed on the top of the grinder. From there the material goes on a horizontal screw conveyor. This screw conveyor, that can be powered by a hand wheel or an electric motor, squashes and partially mixes the food. At the end of the screw conveyor there is a knife installed directly in front of the fixed hole plate. At this opening the minced meat comes out of the machine. The fineness of the meat depends on the size of the holes of the plate. The meat grinder was invented by Karl Drais in the 19th century.

By changing the hole plate it is also possible to produce breadcrumbs or fill sausage making. After the drop from the retainer, it is possible to change the hole plate. By removing the fixing screw the grinder can be disassembled completely for cleaning. Besides the domestic manually or motor operated grinders, there are also grinders for butchery (table- or shop-grinders for example) and for the food industry. Some large machines are able to produce several tons per hour.

For these machines the Typ-C-norm DIN EN 12331 "machines for the food industry - butchery grinders - safety- and hygiene requirements" from 2004-5 with the change from 2007-A2, is applied.

A basic optional feature for larger grinders is the mixer unit. With this unit can be mixed different kinds of meat(for example beef or pork) with each other homogeneously and/or can be mixed the meat with additives, like salt or spices, before grinding it. Without such a mixer unit, the additives must be mixed into the meat after grinding it, which adversely affects the taste and appearance of most products.

3. Answer the questions:

1. What is a meat mincer?

2. What tools does a meat mincer replace?
3. Where does the producer put the minced food?
4. Where is a funnel placed?
5. Where does the minced food go from a funnel?
6. What does the screw conveyor do?
7. What is installed at the end of the screw conveyor?
8. Who invented the meat grinder?
9. When was the meat grinder invented?
10. What is a basic optional feature for larger grinders?

4. Fill in the words from the list:

Grinder, depends, food, knife, squashes, breadcrumbs, feature, disassembled, raw, mixes, taste, additives, appearance

1. A meat grinder or meat mincer is a kitchen appliance for grinding, fine mincing or mixing ... or cooked meat, fish, vegetables or similar food.
2. The producer puts the minced food into a funnel, which is placed on the top of the
3. This screw conveyor, that can be powered by a hand wheel or an electric motor, ... and partially ... the food.
4. At the end of the screw conveyor there is a ... installed directly in front of the fixed hole plate.
5. The fineness of the meat ... on the size of the holes of the plate.
6. By changing the hole plate it is also possible to produce ... or fill sausage making.
7. By removing the fixing screw the grinder can be ... completely for cleaning.
8. Besides the domestic manually or motor operated grinders, there are also grinders for butchery (table- or shop-grinders for example) and for the ... industry.
9. A basic optional ... for larger grinders is the mixer unit.

10. With this unit can be mixed different kinds of meat(for example beef or pork) with each other homogeneously and/or can be mixed the meat with ... , like salt or spices, before grinding it.

11. Without such a mixer unit, the additives must be mixed into the meat after grinding it, which adversely affects the ... and ... of most products.

UNIT 6: Slicing machine

Essential vocabulary

slicing machine

butcher shop

delicatessen

cheese

recently

available

carriage

blade

content

condition

moderate

prosperity

demand

carving

predominant

1. Match the words and definitions

Slicing machine	a) a foodstuff produced from meat;
Juicer	b) an electrical device designed for grinding food;
Butcher	c) a tool for slicing meat and cheese;
Blender	d) a heating appliance designed for cooking;
Sausage	e) a tool for extracting juice;
Refrigerator	f) a kind of job connected with meat;
Kitchen stove	g) an electrical device for food storage

2. Read and translate the text:

Slicing machine

A meat slicer, slicing machine, or also called a deli slicer or simply a slicer, is a tool used in butcher shops and delicatessens to slice meats and cheeses. The first

meat slicer was invented by Wilhelm van Berkel in Rotterdam in 1898. Older models of meat slicer may be operated by crank, while newer ones generally use an electric motor.

More recently, meat slicers have become available in the home market for people wanting to slice their own meats and cheeses.

At the turn of the nineteenth century a revolutionary meat slicer was invented in Holland by Wilhelm Van Berkel. It is credited as the first device to move the carriage and food into a spinning blade. The pre-cursor to the famous Hobart device.

People were no longer content with simple bread and cheese. Social conditions and a moderate degree of prosperity fueled their demand for more meat and sausage. Using simple carving knives, butchers were kept busy all day slicing meat.

The Berkel meat slicer invention revolutionized the butcher's trade, where the quality of cut and the speed of the slicer became the predominant benefits of the new machines. Antique Berkel meat slicers are difficult to find and they now draw a premium. Berkel stopped making the vintage style slicers in the 1960's.

3. Answer the questions:

1. What is a slicing machine?
2. Who invented the first meat slicer?
3. When was the first meat slicer invented?
4. What have become with meat slicers more recently?
5. When was a revolutionary meat slicer invented?
6. Who invented a revolutionary meat slicer?
7. Where was a revolutionary meat slicer invented?
8. How is a revolutionary meat slicer credited?
9. What were butchers used for slicing meat?
10. When did Berkel stop making the vintage style slicers?

4. Fill in the words from the list:

Meat slicer, carriage, knives, vintage, electric, tool, slice, food, content, device, butcher shops, speed, delicatessens, cut

1. A meat slicer, slicing machine, or also called a deli slicer or simply a slicer, is a ... used in ... and ... to slice meats and cheeses.
2. The first ... was invented by Wilhelm van Berkel in Rotterdam in 1898.
3. Older models of meat slicer may be operated by crank, while newer ones generally use an ... motor.
4. More recently, meat slicers have become available in the home market for people wanting to ... their own meats and cheeses.
5. It is credited as the first device to move the ... and ... into a spinning blade.
6. The pre-cursor to the famous Hobart
7. People were no longer ... with simple bread and cheese.
8. Using simple carving ... , butchers were kept busy all day slicing meat.
9. The Berkel meat slicer invention revolutionized the butcher's trade, where the quality of ... and the ... of the slicer became the predominant benefits of the new machines.
10. Berkel stopped making the ... style slicers in the 1960's.

UNIT 7: Principles of microwave oven work

Essential vocabulary

microwave oven - мікрохвильова піч	frequencies -частоти
common - загальний	misconception - непорозуміння
substance - речовина	induce -викликати
absorb energy -поглинають енергію	deeply -глибоко
movement -рух	water content -водний вміст
microwave heating -мікрохвильове нагрівання	broiling -підсмажування
efficient -ефективний	penetration -проникнення
liquid -рідина	lower -знизити
resonance -резонанс	initial -початковий
vapor -пара	dielectric - діелектрик
	moreover - більше того

1. Match the words and definitions

Microwave heating	1. of 2.45 gigahertz (GHz) ;
Frequencies	2. electromagnetic radiation, resonance , a material in which charges can not move from one body to another;
Dielectric	3. from the microwaves in a process called dielectric heating;
Food additives	4. phenomenon is the strong growth of the amplitude;
Resonance	5. food industry, which includes companies with production of milk and various milk products;
Dairy industry	6. food industry that produces and shag tobacco products (cigarettes, cigarettes, cigarette tobacco, tobacco);
The tobacco industry	7. are substances which are added to foods for technological reasons, so they are not corrupted themselves, do not change color and consistency

2. Read and translate the text:

Principles of microwave oven work

A microwave oven works by passing non-ionizing microwave radiation, usually at a frequency of 2.45 gigahertz (GHz)—a wavelength of 122 millimetres (4.80 in)—through the food. Microwave radiation is between common radio and infrared frequencies. Water, fat, and other substances in the food absorb energy from the microwaves in a process called dielectric heating. Many molecules (such as those of water) are electric dipoles, meaning that they have a positive charge at one end and a negative charge at the other, and therefore rotate as they try to align themselves with the alternating electric field of the microwaves. This molecular movement represents heat which is then dispersed as the rotating molecules hit other molecules and put them into motion.

Microwave heating is more efficient on liquid water than on fats and sugars (which have a smaller molecular dipole moment), and also more efficient than on frozen water (where the molecules are not free to rotate). Microwave heating is sometimes explained as a resonance of water molecules, but this is incorrect: such resonance only occurs in water vapor at much higher frequencies, at about 20 GHz. Moreover, large industrial/commercial microwave ovens operating at the common large industrial-oven microwave heating frequency of 915 MHz—wavelength 328 millimetres (12.9 in)—also heat water and food perfectly well.

A common misconception is that microwave ovens cook food "from the inside out". In reality, microwaves are absorbed in the outer layers of food in a manner somewhat similar to heat from other methods. The misconception arises because microwaves penetrate dry non-conductive substances at the surfaces of many common foods, and thus often induce initial heat more deeply than other methods. Depending on water content, the depth of initial heat deposition may be several centimetres or more with microwave ovens, in contrast to broiling (infrared) or convection heating, which deposit heat thinly at the food surface. Penetration depth of microwaves is dependent on food composition and the frequency, with lower microwave frequencies (longer wavelengths) penetrating better.

3. Answer the questions:

1. What are the main principles of microwave oven?
2. What is the frequency of the microwave?
3. What is microwave radiation?
4. Which wavelength?
5. What the process dielectric heating ?
6. Explain the process of Microwave heating ?
7. Which the penetration depth of waves?
8. Which the common misconception in microwave ovens ?

4. Fill in the words from the list:

common , water content, penetration , arises ,misconception, lower, movement, non-ionizing, molecules, efficient

1. A microwave oven works by passing ... microwave radiation.
2. Microwave radiation is between ... radio and infrared frequencies.
3. This molecular ... represents heat which is then dispersed as the rotating ... hit other molecules and put them into motion.
4. Microwave heating is more ... on liquid water than on fats and sugars
5. A common ... is that microwave ovens cook food "from the inside out".
6. Depending on ... , the depth of initial heat deposition may be several centimetres or more with microwave ovens.
7. ... depth of microwaves is dependent on food composition and the frequency, with ... microwave frequencies (longer wavelengths) penetrating better.
8. The misconception ... because microwaves penetrate dry non-conductive substances at the surfaces of many common foods.

UNIT 8: Microwave oven history

Essential vocabulary

heating effect- тепловий ефект

self-taught- самоук

magnetron- магнетрон потужний генератор високочастотних електромагнітних хвиль

peanut chocolate- арахісовий шоколад

to melt-плавити

explode-вибухати

high density- висока щільність

electromagnetic field- електромагнітне поле

microwave-мікрохвиля

microwave cooking process- Процес приготування в мікрохвильовій печі

water-cooled- з водним охолодженням

electronic ovens- електронні печі

microwave ovens- мікрохвильові печі

households- домашнє господарство

Current estimates- поточні оцінки

1. Match the words and definitions

Simultaneously	1. at the same time
Electromagnetic field	2. describes the interaction between physical bodies.
To melt	3. household appliances for fast cooking or heating food quickly
Density	4. to solve

To market	5. without gaps
Microwave	6. transition from the solid state body in liquid

2. Read and translate the text:

Microwave oven history

The use of high-frequency electric fields for heating dielectric materials had been proposed in the 1930s, for example US patent 2,147,689 (application by Bell Telephone Laboratories, dated 1937) states "This invention relates to heating systems for dielectric materials and the object of the invention is to heat such materials uniformly and substantially simultaneously throughout their mass. ... It has been proposed therefore to heat such materials simultaneously throughout their mass by means of the dielectric loss produced in them when they are subjected to a high voltage, high frequency field."

The heating effect of microwaves was discovered accidentally in 1945. Percy Spencer, an American self-taught engineer from Howland, Maine, was building magnetrons for radar sets with the American company Raytheon. He was working on an active radar set when he noticed that a peanut chocolate bar he had in his pocket started to melt. The radar had melted his chocolate bar with microwaves. The first food to be deliberately cooked with Spencer's microwave was popcorn, and the second was an egg, which exploded in the face of one of the experimenters. To verify his finding, Spencer created a high density electromagnetic field by feeding microwave power into a metal box from which it had no way to escape. When food was placed in the box with the microwave energy, the temperature of the food rose rapidly.

On October 8, 1945 Raytheon filed a U.S. patent for Spencer's microwave cooking process and an oven that heated food using microwave energy was placed in a Boston restaurant for testing. In 1947, the company built the Radarange, the first microwave oven in the world.[3] It was almost 1.8 metres (5.9 ft) tall, weighed 340 kilograms (750 lb) and cost about US\$5000 each. It consumed 3 kilowatts, about three times as much as today's microwave ovens, and was water-cooled. An early

commercial model introduced in 1954 consumed 1.6 kilowatts and sold for US\$2000 to US\$3000. Raytheon licensed its technology to the Tappan Stove company in 1952. They tried to market a large, 220 volt, wall unit as a home microwave oven in 1955 for a price of US\$1295, but it did not sell well. In 1965 Raytheon acquired Amana, which introduced the first popular home model, the countertop Radarange, in 1967 at a price of US\$495.

In the 1960s, Litton bought Studebaker's Franklin Manufacturing assets, which had been manufacturing magnetrons and building and selling microwave ovens similar to the Radarange. Litton then developed a new configuration of the microwave, the short, wide shape that is now common. The magnetron feed was also unique. This resulted in an oven that could survive a no-load condition indefinitely. The new oven was shown at a trade show in Chicago, and helped begin a rapid growth of the market for home microwave ovens. Sales volume of 40,000 units for the US industry in 1970 grew to one million by 1975. Market penetration in Japan, which had learned to build less expensive units by re-engineering a cheaper magnetron, was faster.

Several other companies joined in the market, and for a time most systems were built by defense contractors, who were most familiar with the magnetron. Litton was particularly well known in the restaurant business. By the late 1970s the technology had improved to the point where prices were falling rapidly. Often called "electronic ovens" in the 1960s, the name "microwave ovens" later became standardized, often now referred to informally as simply "microwaves." Formerly found only in large industrial applications, microwave ovens were increasingly becoming a standard fixture of most kitchens. The rapidly falling price of microprocessors also helped by adding electronic controls to make the ovens easier to use. By 1986, roughly 25% of households in the U.S. owned a microwave oven, up from only about 1% in 1971. Current estimates hold that over 90% of American households own a microwave oven.

3. Answer the questions:

- 1) When was discovered the heating effect of microwaves?

- 2) Who discovered it?
- 3) What happened with chocolate bar in his pocket?
- 4) What food was firstly cooked with Spencer's microwave?
- 5) What created Spencer to patent his finding?
- 6) Where microwave oven was placed for testing?
- 7) When was built first microwave oven in the world?
- 8) How many kilowatts it consumed first?
- 9) What was the size of first microwave oven in the world?
- 10) How many households own microwave oven?

4. Fill in the words from the list:

heating effect, self-taught, peanut chocolate, electromagnetic field, microwaves, using, in, about, water-cooled, increasingly becoming, magnetrons

1. To verify his finding, Spencer created a high density ... by feeding microwave power into a metal box from which it had no way to escape.
2. The... of microwaves was discovered accidentally in 1945. Percy Spencer, an American ... engineer from Howland, Maine, was building ...for radar sets with the American company Raytheon.
3. He was working on an active radar set when he noticed that a ...bar he had in his pocket started to melt.
4. It was almost 1.8 metres (5.9 ft) tall, weighed 340 kilograms (750 lb) and cost ...US\$5000 each.
5. On October 8, 1945 Raytheon filed a U.S. patent for Spencer's microwave cooking process and an oven that heated food ...microwave energy was placed in a Boston restaurant for testing. In 1947, the company built the Radarange, the first microwave oven ... the world.
6. Formerly found only in large industrial applications, microwave ovens werea standard fixture of most kitchens.

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