ملخص كيمياء سنة تحضيريه

Chapter 1

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Chapter 1: matter and measurement

Lesson 1: classification and state of matter [1]

1-1: atoms and molecules (الذرات والجزيئات)

Atoms : are the submicroscopic particles that constitute the basic building blocks of matter

الذرة : هي عباره عن جسيم مجهري والذي يشكل الوحدة البنائية للمادة

Atoms are the building blocks of matter. مهم جدا

Each **element** is made of a unique kind of **atom** (118 elements are discovered in the universe)
كل العناصر تتكون من نوع فريد من الذرات يختلف عن العنصر الاخر وعدد العناصر المكتشفة حاليا هم 118 عنصر

A **compound** is made of two or more atoms of different kinds of **elements**, bonded together to form **molecules** (building blocks of **compounds**) مهم جدا

المركبات تتكون من ذرتين او اكثر من العناصر المختلفة مرتبطة مع بعض بروابط كيميائية ..... الوحدة البنائية للمركبات هي الجزيئات

free atoms are not common in natural

الذرات لا يمكن ان تكون حرة في الطبيعة ولكن تكون مرتبطة بذرات اخرى

Molecules: are group of atoms held together by chemical bonds

الجزيئات هي عبارة عن مجموعه من الذرات المرتبطة مع بعضها بواسطه روابط كيميائية

Atoms and molecules determine how matter behaves
الذرات والجزيئات تحدد سلوك المادة

What is chemistry ?

Chemistry is the study of matter and its changes and is the science that seek to understand the behavior of matter by studying the behavior of its atoms and molecules

الكيمياء تعني هي دراسة المادة وتغيراتها وهو علم يبحث في فهم سلوك المادة

1-2 : the classification of matter (تصنيفات المادة)

Matter : anything that takes up space and has mass

المادة: هي التي تشغل حيزا ما ولها كتله

What is the matter made from ?

The matter made of atoms and molecules

Example of matter : desk , chair

Classification of matter: تصنيفات المادة

1- **according to composition بالنسبة للتركيب:**

matter is classified according to the basic component that make it up (pure substance or mixture)

example : carbon monoxide (co) contain atom carbon and atom oxygen atom held together by chemical bonding

اولا تصنف المادة على حسب المكونات الاساسية المصنوعة منها او انها مادة نقيه او مخاليط مثل اول اكسيد الكربون يحتوي على ذرة كربون وذرة اوكسجين مرتبطين مع بعض برابطه كيميائية

Classification of matter according composition: تصنيف المادة بناء على مكوناتها [2]

Pure substance مواد نقيه

They are compose of one substance and can't be physically separated هي تتكون من عنصر واحد ولا يمكن فصلها فيزيائيا وتنقسم الي قسمين

Element عناصر	**Compound مركبات**
It can't be broken down by chemical reaction Example : He , O2 ,Fe هي التي لا يمكن كسرها بالتفاعلات الكيمائية	It can be chemically separated into its element Example : Water can be chemically separated to H and O – atoms Water = H_2O وهي التي يمكن فصلها كيميائيا الي عناصر

Mixture مخاليط

They are composed of more than one substance and can be physically separated وهي تتركب من اكثر من عنصر ويمكن فصلها فيزيا وتنقسم الي قسمين

Homogeneous متجانس	**Heterogeneous غير متجانس**
It has uniform properties or composition Example : tea with sugar حيث تكون مكوناته ممزوجة مع بعض مثل الشاي بالسكر Salt water is a homogeneous mixture.	It doesn't has uniform properties Example : Sandy with water هو غير ممزوج مع بعض مثل الرمل مع الماء

2- **according to physical state: وبالنسبة للحالة الفيزيائية**

تصنيف المادة على حسب الحالة الفيزيائية

1-solid (s) الحاله الصلبة

2-liquid (l) الحالة السائلة 3- gas (g) الحالة الغازية

the stat of matter change with increasing in temperature

وحالات المادة تتغير بازدياد درجة الحرارة

Different structure of atoms and molecules lead to different properties

التغير في بناء الذرات والجزيئات يؤدي الي التغير في خواصها[3]

Comparison between the 3 stat of matter (المقارنة بين الثلاث حالات من المادة)

Property(الخواص)	Solid	Liquid	Gas
Shape (الشكل)	Fixed(not change - rigid) shape rigid (ثابت الشكل)	No fixed shape ...shape of the container ليست ثابتة الشكل ولكن تأخذ شكل الوعاء الذي يحتويها	Not fixed shape .... Shape of whole container ليست ثابتة الشكل ولكن تأخذ شكل الوعاء الذي تحتويه
Volume(الحجم)	Fixed(not change - rigid) volume	Fixed volume ثابت الحجم	Not fixed volume expands to fill the container ليس ثابت الحجم ولكن يتمدد ليملا الوعاء
Motion of practical (الحركة بين الجزيئات)	Practical in fixed location so they can only vibrate الجزيئات ثابتة ولذلك فقط تهتز solid matter, atoms or molecules pack close to each other in fixed locations. المادة الصلبة ذراتها وجزيئاتها قريبة من بعض ومواقعها ثابتة	Practical can freely more about with less degree as compare to gas الجزيئات حرة نوعا ما ولكن ليست بحرية الغاز	Practical can freely move throughout the whole container الجزيئات تتحرك بحرية في جميع الوعاء The gaseous matter has a lot of space between atoms or molecules. الحالة الغازية المسافة بين الجزيئات كبيرة
Compressibility قابليته) للضغط (	Not easy to compress ليس من السهل ضغطها	Not easy to compress ليس من السهل ضغطها	Easy to compress سهل الضغط
Example (مثال)	Ice الثلج Ice, aluminum, iron, and diamond are	Liquid water Water, alcohol, oil, and gasoline	Water vapor بخار الماء

Solid state (حالات المادة الصلبة) :

Crystalline (بلورية)	Amorphous (غير بلورية)
Atoms or molecules are arranged in patterns of long-range repeating order Example : diamond الذرات او الجزيئات تترتب في تنظيم معين مثل الالماس	**Atoms or molecules are not arranged in patterns of long-range rep** eating order Example :glass الذرات او الجزيئات تكون بشكل عشوائي اي

[3] **الأستاذة : سامية النجار (المدينة المنورة) جوال : 0580957642**

table salt (NaCl) **ملح الطعام**	ليست مرتبه مثل الزجاج plastic البلاستيك

state of change : حالات تغير المادة

melting (الانصهار) : change from solid to liquid

Freezing (التجمد) :change from liquid to solid

Vaporizing (التبخر) :change from liquid to gas

Condensing (التكثف):change from gas to liquid

Sublimation (التسامي): change from solid to gas without pass in liquid state

Deposition (الترسيب) :change from gas to solid without pass in liquid state

1-3 physical and chemical change and properties : الخواص والتغيرات الفيزيائية والكيمائية

1- physical change :-it is change that altars only the stat (appearance)of matter but without change in its composition هو التغير في حالة المادة او شكلها بدون التغير في تركيبها
2- chemical change : it is change that altars the composition of matter
وهو التغير في تركيب المادة
Example : burning of fuel : احتراق البنزين $C_3H_8 \rightarrow CO_2 + H_2\ O$
As an evidence for the chemical change the appearance and behavior of matter are changed
Example : rusting of iron , apertment color change can indicate that a chemical change is happened
صدأ الحديد او اي شيء يصاحب تغير في لونه

a)Gas release (bubbles) الغاز يطلق الفقاعات

b)Light or release of heat energy اطلاق الحرارة والضوء

c)A permanent color change التغير في اللون

What is the difference between physical and chemical change ?

	physical change	chemical change
Molecules	Not change	Changed
Composition	Not change	Changed

Properties of matter : خواص المادة

physical Properties	Chemical Properties
The property that a substance display without change in its composition example : 1- boiling (الغليان) 2- Melting(الانصهار) 3- density (الكثافة) 4- Viscosity(اللزوجة) 5- Color(اللون) 6- odor(الرائحة) 7- Boiling point	The property that a substance display with change in its composition through chemical change Example : 1- burring in air (الحرق) 2- heat decomposition 3- reaction with another substance (التفاعل مع اي مادة) 4- flammability of gasoline (قابلية الاشتعال) 5- digestion الهضم

Physical Properties

✓ Color	✓ Malleability
✓ Odor	✓ Viscosity
✓ Density	✓ Hardness
✓ Melting Point	✓ Metallic Luster
✓ Boiling Point	✓ Ductility

Example 1-1 page 6

Determine whether each change is physical or Chemical?[4]

1- The evaporation of rubbing alcohol (تبخر الكحول)
   Physical (because change from liquid to gas) and still alcohol
2- Bleaching of hair (صبغة الشعر)?
   Chemical
3- Forming of frost on a cold night (تكون الصقيع في الغابات في الليل البارد)

Physical

1-4 energy fundamental part of physical and chemical change :

Law of conservation of energy :

Energy is neither created or destroyed it is change from one type to another

Work : it is the action of force through distance

Kinetic energy (KE): it is the ability to do work (energy required to do work) or energy that the matter possesses due to its motion[5]

KE $(solid)$ $<$ KE(liquid) $<$ KE (gas)

As temperature increases as KE increases

Potential energy (PE): the energy stored in the body by its position example : stored battery raised ball.

The energy

Matter and measurements:[6]

the two most common unit system are

1- English system(inch , yard , pound)
2- Metric system : international system of unite scientist use the (SI) which base .

What are the unite of measurement ?

they are the stander quantities that used to specify the measurement.

The Metric system :

Measurement	Metric	SI
Length	Meter (m)	meter (m)
Volume	Liter (L)	Cubic meter (m^3)
Mass	Gram (g)	Kilogram
Temperature	Celsius	Kelvin (K)
Time	Second	Second (s)

Length :

Both metric and IS system use meter (m) but for small distance centimeter can be used

2.54 cm	= 1 inch
1 m	= 100 cm
1 m	= 39.4 in
1 m	= 1.09 yd

Mass and weigh :

Mass is measure of the quantity of matter within the object .

While the weight is the measure of the gravitational pull on its matter .

1 kg = 2.21 lb , kg = 1000g or g= $\frac{1}{1000kg}$

The person's mass in the moon = $\frac{1}{6}$ on earth

For example : a man has 130 pound in earth so in the moon = 130/6 = 21.5

Volume : it is the space that occupied by matter .

1L=1000mL [7]

1 m^3= 1000L

Time : second : the SI stander unite of time defined as duration 9192631770 period of the radiation emitted from a certain transition in a cesium 133 atom

Temperature : the kelvin (k) is the SI unite and the Temperature of sample of matter is a measure of a mount of average of kinetic energy the energy due to motion .

There are 3 common unite for Temperature:

1- Celsius (℃) 2- Fahrenheit (℉) 3- kelvin (K)
2- Common Units of Temperature:
3- Fahrenheit (°F)
4- Celsius (°C)
5- Kelvin (K)
6- Boiling Point of Water:

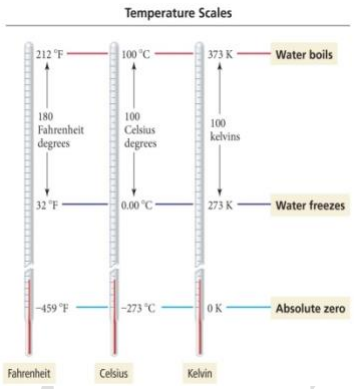
212°F , 100°C, 373.15 K

Freezing Point of Water

32°F, 0°C, 273.15 K

Absolute zero is 0 K.

You can't get any colder than this



You can convert between the Temperature scales with the following formulas :

$°C = \frac{°F-32}{1.8}$, $°F = 1.8 * °C + 32$, $K = °C + 273.15$, $°C = K - 273.15$

Example : convert 350 °F to °C ?

We use $°C = \frac{°F-32}{1.8}$ $= \frac{350-32}{1.8}$ = 177 °C

Convert 298 K to °C ?

We use $°C = K - 273.15$ = 298 – 273.15 =25 °C

and prefix multipliers: Type equation here.

To increase or decrees the size of the unite some prefix (power of 10) are used :

Prefixes that increase للزيادة	Prefixes that decrease للنقصان
Kilo (K) = 1000 =$\mathbf{10^3}$	Deci (d) = 10^{-1}
Mega (M) = 1000000= $\mathbf{10^6}$	Centi (c) =10^{-2}
Giga (G)= 1000000000= $\mathbf{10^9}$	Milli(m)= 10^{-3}
Tera (T)= $\mathbf{10^{12}}$	Micro(μ) =10^{-6}

Peta(P)= $\mathbf{10^{15}}$	Nano(n) = 10^{-9} Pico (p) = 10^{-12} Femto(f)= 10^{-15}

Density :

It is the mount of matter in substance per unit volume .

Density = $\frac{mass}{volume}$ 8

unite of density are:

g\L for gases , g\mL for liquid , $g\backslash cm^3$ for solid

example :

1- A 0.258 g sample of HDL has volume of 0.215 cm^3 what is the density ?

Answer : Density = $\frac{mass}{volume}$

= 0.258\0.215 = 1.20 $g\backslash cm^3$

Note 1 : relative density (water)

Substance that has greater than density in water …..sinks

But that with less density ……floats over the water .

Note 2 : density calculation by volume displacement :

In the same case the volume of object can be calculation adding the object to water in gravated cylinder .

2- What is the density of 48 g sample of metal if the level of water in a gradvated cylinder rises from 25 ml to 33 ml after the metal is added ?

answer : volume of metal = 33-25=8 ml

d= m\v = 48\8 =6 g\ml or 6 $g\backslash cm^3$

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Choose the most correct answer:

Q 1. The matter is made of …… and …….. .

A. Atoms.

B. Molecules.

C. Both atoms and molecules.

D. None.

Q 2. The state of the matter can be changed by varying the ……. .

A. Temperature

. B. Amount.

C. Container.

D. Mass.

Q 3. …… state of matter which has constant mass, fixed volume, and variable shape.

A. Solid.

B. Liquid.

C. Gas.

D. None.

Q 4. N_2 is an example of …….. and …….. .

A. Molecular compound.

B. atomic compound.

C. Molecular element.

D. atomic element.

Q 5. Oil/water mixture is an example of …… .

A. Pure substance. B. Pure compound.

C. Heterogeneous mixture

. D. Homogeneous mixture.

Q 1. Boiling of water is an example of …….. .

A. physical property

. B. physical change.

C. chemical property.

D. chemical change.

Q 2. Evaporation of alcohol at room temperature is an example of …….

A. physical property.

B. physical change.

C. chemical property.
D. chemical change.

Q 3. With chemical changes, the composition of a substance stays the same, but its properties may change.

A. True.
B. false.

Q 4. ……. energy is the stored energy in the object by its position.

A. Potential energy.
B. Kinetic energy.

Q 5. Energy cannot be created or destroyed, it can only be changed from one form to another.

A. True. B. false.

Q 1. The SI unit for volume is the …….. .

A. milliliter (mL).
B. cubic meter.
C. Liter.
D. cubic centimeter.

Q 2. The metric unit for temperature is the:

A. Celsius.
B. Kelvin.
C. Fahrenheit.
D. gram.

Q 3. Liquid water boils at 373.15 K.

A. True.[10]
B. false.

Q 4. The mass of an object with density 2 g/mL and volume 15 mL is ….

A. 15 g.
B. 2 g.
C. 30 g
. D. 7.5 g.

Q 5. A measurement of 5 g equals ___ kg.

A. 5000
B. 500
C. 0.05
D. 0.005

Heterogeneous mixtures-مخاليط غير متجانسة :

1- vegetable soup & chicken soup
(شوربة دجاج - شوربة خضار)
2- water and sand (تراب فّ مويا)
3- pizza (بيتزا)
4- fruit salad (سلطة فواكة)
5- blood (الدم)

Homogeneous mixtures - مخاليط متجانسة :
1- water and sand / sugar in tea
(السكر في الماء- السكر في الشاي)
2- air (الهواء)
3- Mouthwash (غسول الفم)
4- blood plasma (عينة دم)
5- abbott of vinegar (خل)