



Practical General Chemistry

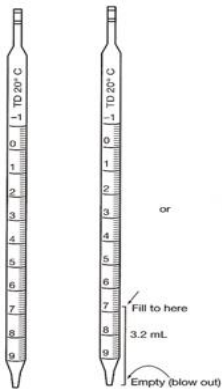


تلخيص عملي كيمياء 101
لطلاب تحضيرى هندسة والعلوم التطبيقية

إعداد الأستاذ: علي نفاذي
0598830460



The most Important Laboratory Tools



Pipette



Digital Pipette



beaker



Conical flask



Digital Balance



burette



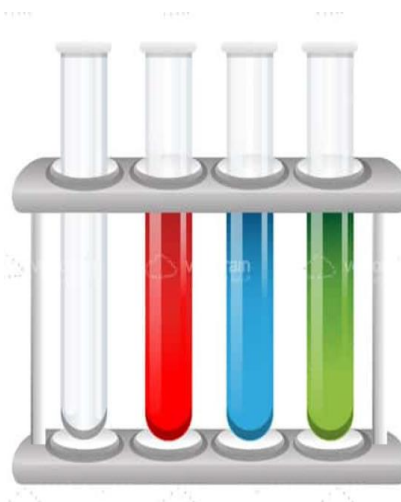
Stand



Washing bottle



funnel



Test tubes



Bunsen Burner

The most Important Concept

What is a titration? The act of adding standard solution in small quantities to the test solution till the reaction is complete is termed titration.

(إن عملية إضافة محلول قياسي بكميات صغيرة إلى محلول الاختبار حتى اكتمال رد الفعل-يتغير اللون-يسمى بالمعايرة)

What is a standard solution? A standard solution is one whose concentration is precisely known.

(المحلول القياسي هو الحل الذي يعرف تركيزه بدقة)

What is a test (unknown) solution? A test solution is one whose concentration is to be estimated.

(محلول الاختبار هو المحلول الذي يجب تقدير تركيزه)

Indicators are chosen, such that they change colors at the range of the pH of interest

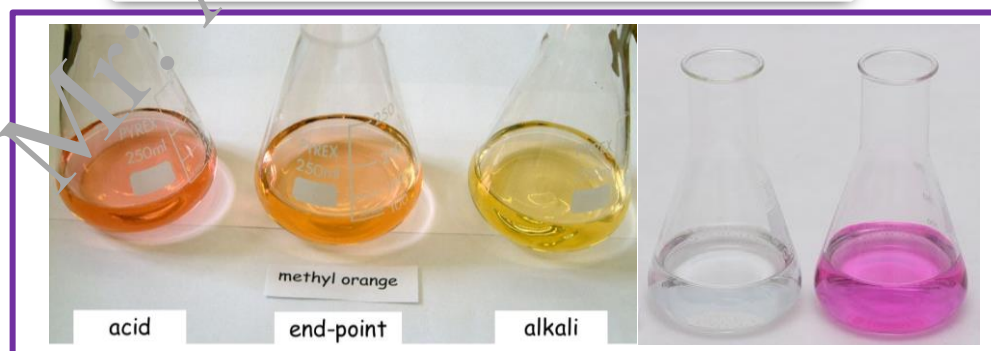
(يتم اختيارهم ، بحيث يغير ألوانها تبعاً لدرجة الحموضة - هي أصباغ كيميائية يتأثر لونها بالمحاليل الحامضية والقاعدية)

Indicators	Acid	Base(alkoli)
ph.ph	Color Less	Pink
M.O	Red	Yellow – Orange

The most Important Laws

$$M_a V_a = M_b V_b$$

(Acid) (Base)



Answer the following questions

Choose the best answer:

1- The color of M.O indicator change from toat titration strong acid and base

1- colorless to red 2- yellow to red 3- pink to red

2- The color of ph.ph indicator change from to at titration strong acid and base

1- pink to colorless 2- yellow to red 3- pink to red



3- A suitable indicator for titration of strong base with weak acid is:

- 1- ph.ph 2- pH 3- titration curve 4- M.O

4- Is not suitable indicator for titration of strong base with weak acid is:

- 1- ph.ph 2- pH 3- titration curve 4- M.O

5- The color of ph.ph indicator change from to at titration strong base and weak acid

- 1- Colorless to pink 2- yellow to red 3- pink to red

6- During titration of CH_3COOH by NaOH , the color of the indicator changes from to of ph.ph

- 1- Yellow to red 2- Pink to yellow 3- Red to pink 4- Colorless to pink

7- Both NaOH and HCl are:

- 1- Acids 2- Bases 3- Strong

8- One of the following does not used during titration:

- 1- pipette 2- Balance 3- burette

9- both molecular weight and equivalent weight of NaOH

- 1- are the same 2- different

10- Methyl orange indicator is type of

- 1- azo dye 2- inorganic compound 3- Strong base

11- Acetic acid considered as:

- 1- strong acid 2- weak acid 3- an electrolyte 4- both 2 and 3

12- the equivalent weight of CH_3COOH equals:

- 1- 60 2- 30 3- 40 4- none of these

2) What is the molarity of a nitric acid (HNO_3) solution if 43.33 mL of 0.1000 M KOH solution is needed to neutralize 20.00 mL of the acid solution?

3) What is the concentration of HCl if 30.0 mL of 0.10 M NaOH neutralizes 50.0 mL HCl ? $\text{NaOH} + \text{HCl} \rightarrow \text{H}_2\text{O} + \text{NaCl}$



Density

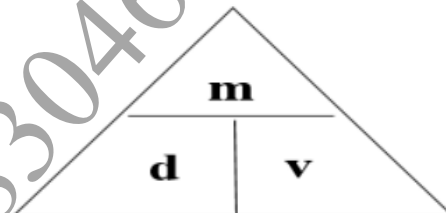


The most Important Concept

density is defined as the mass of substance per unit volume

The most Important Laws

Quantity	unit
Mass (m)	kg → SI g
Volume (v)	m^3 → SI L ml
Density (d)	Kg/m^3 → SI g/cm^3 → solids g/ml → Liquids g/L → gases



$$m = d \times v$$
$$d = \frac{m}{v}$$
$$v = \frac{m}{d}$$

$$1 \text{ L} = 1000 \text{ mL} = 1000 \text{ cm}^3 = 1 \text{ dm}^3$$

Answer the following questions

Choose the best answer:

1. If 25 g of a liquid occupies 20 cm³ in a measuring cylinder, what is the density of the liquid?

- a) 0.25 g cm⁻³ b) 0.8 g cm⁻³ c) 1.25 g cm⁻³ d) 5 g cm⁻³

2. You have a rock with a volume of 15 cm³ and a mass of 45 g. What is its density?

- a) 0.25 g cm⁻³ b) 0.8 g cm⁻³ c) 1.25 g cm⁻³ d) 3 g cm⁻³

3. If you have Ethanol with a mass of 45 g and a volume of 5 mL, How did you determine its density?

- a) 0.25 g cm⁻³ b) 0.8 g cm⁻³ c) 1.25 g cm⁻³ d) 9 g cm⁻³

4. If we use the units of grams (g.) for mass and cubic centimeters (cm³) for volume, then the units for density will be?

- a) g/m³ b) kg/m³ c) kg/m d) g/cm³

5. Which one of the following is not a unit of density?

- a) g/ml b) kg/m³ c) kg/m d) g/cm³



Viscosity



The most Important Concept

Viscosity is defined as the resistance of a fluid to flow either liquid or gas.



The most Important Laws

$$\eta = \eta_s (t_p) / (t_{sp})$$

where :

η is the viscosity of the fluid (لزوجة السائل)

η_s viscosity of water (لزوجة الماء)

t time taken for the level of the liquid to pass between the marks (زمن تدفق السائل)

t_s time taken for the level of water to pass between the marks (زمن تدفق الماء)

ρ density of the liquid (كثافة السائل)

ρ_s density of water (كثافة الماء)

Answer the following questions

In The Viscosity Experiment . we get viscosity Water 0.0091 poise in time 11sec , density of water 0.997g/ml , and density of Aceton 0.784 g/ml , time 20 sec , calculate Viscosity of Aceton ?

Choose the best answer:

1- What happens to the viscosity of a liquid when its temperature is raised?

- a. The viscosity of the liquid increases.
- b. The viscosity of the liquid stays the same.
- c. The viscosity of the liquid decreases.

2- What are fluids?

- a. substances that flow
- b. Liquids, and gases
- c. a&b
- d. non of the above

3- The the attraction between molecules, the greater the viscosity of the fluid.

- a. stronger
- b. weaker
- c. more red

4- What measures a materials resistance to flow?

- a. Matter
- b. Volume
- c. Hardness
- d. Tensile Strength
- e. viscosity

5- Water has a very low viscosity equal?

- a. 0.008904 poise at 25 °C Volume
- b. 0.8904 poise at 25 °C Volume
- c. 8904 poise at 25 °C Volume
- d. 8.904 poise at 25 °C Volume

6- An instrument that measures viscosity is called ?

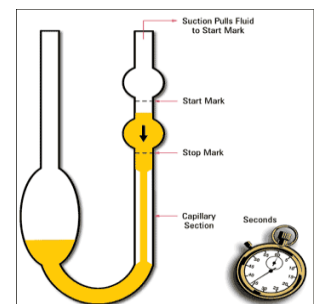
- a. Barometer
- b. viscometer
- c. Manometer
- d. Cantemeter
- e. viscosity

7- Substances have different viscosities because they have?

- a. different flow rates
- b. different thicknesses
- c. a&b
- d. different Mass

7- What are the factors that affecting the viscosity of fluids?

- a. intermolecular forces
- b. temperature
- c. Particle size
- d. a&b&c





Surface Tension



The most Important Concept

Surface Tension $[\gamma]$ is the force per unit length that must be applied parallel to the surface so as to counterbalance the net inward pull and has the units of

(dyne/cm – dyane/cm⁻¹ – N/m at S.I.)

(التوتر السطحي هو القوة لكل وحدة طول والتي يجب تطبيقها بالتوازي مع السطح وذلك لموازنة السحب الداخلي الصافي وله وحدات دايين / سم)

Cohesive force is the force existing between like molecules in the surface of a liquid.

(القوة المتماسكة هي القوة الموجودة بين الجزيئات المشابهة في سطح السائل)

Adhesive force is the force existing between unlike molecules, such as that between a liquid and the wall of a glass capillary tube

(القوة اللاصقة هي القوة الموجودة بين الجزيئات المختلفة ، مثل تلك الموجودة بين السائل وجدار أنبوب شعري زجاجي.)

The most Important Laws

$$\gamma = 1/2 r h \rho g$$

r is the capillary tube radius (نصف قطر الأنبوبة الشعرية)

h is the height of of the liquid (ارتفاع السائل)

g is the acceleration of gravity (الجاذبية الأرضية) 980cm/s³

ρ is the density of liquid (كثافة السائل)

Answer the following questions

In the Surface Tension experiment , the capillary tube radius is 0.05cm , acceleration of gravity is 980cm/s³ , the height of of the liquid is 3.5cm and the density of liquid is 1.3g/cm³

Choose the best answer:

1- Rain drops are spherical in shape because of

- a. Surface tension.
- b. Capillary.
- c. The viscosity of the liquid decreases.
- d. Electrophoresis

3- Plants get water through the roots because of

- a. Capillarity
- b. Viscosity
- c. Gravity
- d. Elasticity

3- Unit of surface tension

- a. dyne/cm²
- b. dyne/cm
- c. dyne/cm³
- d. second

4-Surface tension is

- a. the force per unit length that must be applied parallel to the surface
- b. the mass of substance per unit volume
- c. the resistance of a fluid to flow

5- If two liquids are completely no interfacial tension exists between them

- a. Immiscible
- b. soluble
- c. acidic
- d. miscible

مع لائق تمنياتي لكم بالتوفيق والسداد
لا تنسوني من صالح الدعاء
أ. علي نفاذ