

CHEMISTRY

12 General

Revision Based on
EOT 2 Coverage 2022-2023

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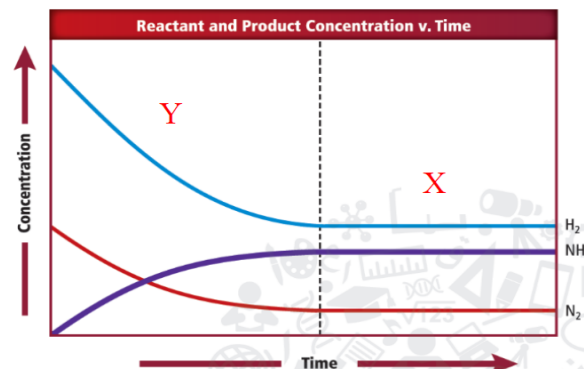


يُعدّد خصائص الاتزان الكيميائي

The characteristics of chemical equilibrium

1) What is the equilibrium condition shown in region X?

- a. the concentration of the reactants decreases
- b. the concentration of the products increases
- c. the concentration of the reactants and products become constant
- d. the concentration of the reactants equal the concentration of the products



يحسب ثابت الاتزان من بيانات التركيز

calculate equilibrium constant from concentration data

2) What is the value of K_{eq} for the equilibrium: $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$, if you know that:

$$[NO_2] = 0.0627 \text{ mol/L}, [N_2O_4] = 0.0185 \text{ mol/L}$$

- a. 3.389
- b. 4.705
- c. 0.295
- d. 0.212

يكتب تعابير الاتزان في الأنظمة المتزنة

Writing the equilibrium expressions for systems that are at equilibrium

3) What is the expression of the equilibrium constant for the reaction?



$$a. K_{eq} = \frac{[CO] [H_2]}{[H_2O]}$$

$$b. K_{eq} = \frac{[H_2O]}{[CO] [H_2]}$$

$$c. K_{eq} = \frac{[CO] [H_2]}{[C] [H_2O]}$$

$$d. K_{eq} = \frac{[C] [H_2O]}{[CO] [H_2]}$$





يُعدّد الخصائص الفيزيائية والكيميائية للأحماض والقواعد

The physical and chemical properties of acids and bases

4) Which of the following properties is **true** for acids and bases?

- a. bases solutions change blue litmus paper to red
- b. the reaction of acid solutions with carbonates produces CO₂ gas
- c. base solutions have a pungent taste
- d. acid solutions have a slippery feel

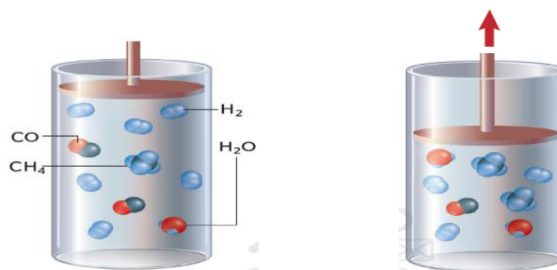
يُطبّق مبدأ لوشاتيليه في الأنظمة المتزنة

Applying Le Châtelier's principle to equilibrium systems

5) What is the effect of decreasing the pressure of the reaction vessel on the equilibrium system below?



- a. CH₄ concentration increases
- b. the equilibrium shifts to the right
- c. the equilibrium shifts to the left
- d. CO concentration decreases



يُطبّق مبدأ لوشاتيليه في الأنظمة المتزنة

Applying Le Châtelier's principle to equilibrium systems

6) Which of the following factors will **not** lead to any change in the amount of substance produced?



- a. removing CH₃CHO from the system
- b. adding C₂H₂ to the system
- c. removing H₂O from the system
- d. adding catalyst to the system





يُطبق مبدأ لوشاتيليه في الأنظمة المتزنة

Applying Le Châtelier's principle to equilibrium systems

7) What is the effect of adding chlorine gas Cl_2 to the equilibrium system below?



- a. produce more PCl_5
- b. the equilibrium shifts to the right
- c. produce more PCl_3
- d. produce more Cl_2

يُفسر تأثير العوامل المختلفة التي تؤثر في الاتزان الكيميائي

Various factors affect chemical equilibrium?

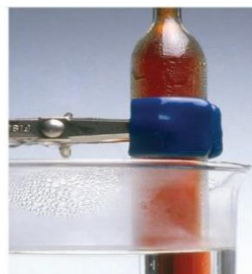
8) In the equilibrium system, which of the following describe the equilibrium if the temperature increases?



colorless



dark brown



- a. NO_2 concentration decreases
- b. K_{eq} will not change
- c. the equilibrium shifts to the left
- d. the dark brown color will appear



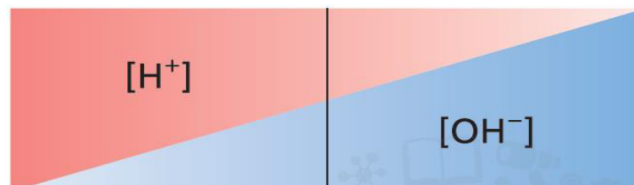


يُصنّف المحاليل إلى حمضية، أو قاعدية، أو متعادلة

Classification of solutions to acidic, basic, or neutral

9) What is the relationship between the concentrations of hydrogen ions and hydroxide ions in **a basic solution**?

- a. $[\text{OH}^-] > [\text{H}^+]$
- b. $[\text{OH}^-] < [\text{H}^+]$
- c. $[\text{OH}^-] = [\text{H}^+] = 1 \times 10^{-14}$
- d. $[\text{OH}^-] = [\text{H}^+] = 1 \times 10^{-7}$



يُقارن نماذج أرهينيوس وبرونشتد – لوري، ولويس للأحماض والقواعد

Comparing the Arrhenius, Brønsted Lowry, and Lewis models of acids and bases

10) What does **NaOH** represent in the equation?



- a. Arrhenius acid
- b. Arrhenius base
- c. acceptor of a pair of electrons
- d. proton donor

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Comparing the Arrhenius, Brønsted Lowry, and Lewis models of acids and bases

11) What is the conjugate pair (acid - base) in the reaction?



- a. H_2O , F^-
- b. HF , H_2O
- c. H_3O^+ , HF
- d. HF , F^-

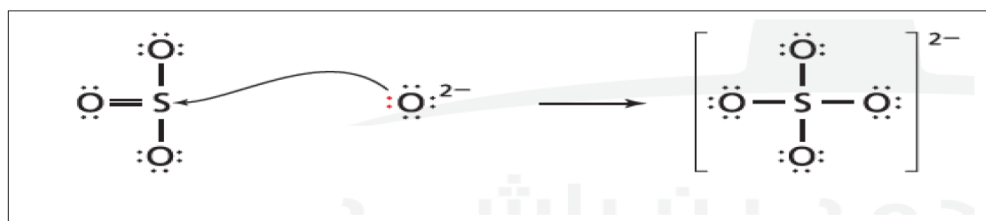




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Comparing the Arrhenius, Brønsted Lowry, and Lewis models of acids and bases

12) Which of the following describes the Lewis acid-base model in the figure below?



- a. O²⁻ is an electron pair acceptor
- b. SO₃ is an electron pair donor
- c. O²⁻ is a Lewis base
- d. SO₃ is a Lewis base

يتعرف العلاقة بين قوة الحمض ودرجة تأينه

The relationship between the strength of acids and bases and the values of their ionization constants

13) What is the weakest acid among the acids in the table below?

- a. H₂S
- b. H₂CO₃
- c. HF
- d. HCN

| acid | K _a |
|--------------------------------|-----------------------|
| HF | 6.3×10 ⁻⁴ |
| H ₂ S | 8.9×10 ⁻⁸ |
| HCN | 6.2×10 ⁻¹⁰ |
| H ₂ CO ₃ | 4.5×10 ⁻⁷ |

يُقارن قوة حمض بقوة قاعدته المرافقة

Comparing the strength of an acid with the strength of its conjugate base

14) Which of the following statements is **true** for the reaction below?

- a. the base NH₃ is weaker than the base OH⁻
- b. the base OH⁻ is weaker than the base NH₃
- c. OH⁻ ion has a lower tendency to attract H⁺ ion than NH₃ molecule
- d. the equilibrium shifts to the right





يُحسب كل من PH وPOH – قياس PH

Calculate of the pH and pOH of aqueous solutions

15) Calculate the K_a for a solution of hydrofluoric acid HF with a concentration of 0.0091 M and a $pH = 2.68$?

- a. 7.6×10^{-5}
- b. 9.9×10^{-5}
- c. 6.2×10^{-4}
- d. 4.8×10^{-4}

يُحسب كلا من PH وPOH

Calculation of pH and pOH

16) If $[OH^-] = 4.0 \times 10^{-11}$ M in a solution, what is the pH of the solution?

- a. 3.6
- b. 3
- c. 10.4
- d. 11

يربط كل من PH وPOH مع ثابت تأين الماء

How are pH and pOH related to the ion product constant for water?

17) What is the pH value of the solution having concentration: 0.02 M HI?

- a. 13.30
- b. 0.69
- c. 12.30
- d. 1.69





يتعرف العلاقة بين قوة الحمض ودرجة تأينه

The relationship between the strength of acids and bases and the values of their ionization constants?

18) Which of the following gives an accurate digital reading of pH in the figures below?

①



②



③



- a. ② only
- b. ① only
- c. ③ only
- d. ① and ②

يتعرف المعادلات الكيميائية لتفاعلات التعادل

Identify the chemical equations of neutralization reactions

19) Which of the following represents a neutralization reaction?

- a. $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{ZnCl}_{2(aq)} + \text{H}_{2(g)}$
- b. $\text{HCl}_{(aq)} + \text{NaOH}_{(aq)} \rightarrow \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)}$
- c. $\text{Mg}(\text{OH})_{2(s)} \rightarrow \text{Mg}^{2+}_{(aq)} + 2\text{OH}^{-}_{(aq)}$
- d. $\text{HF}_{(aq)} + \text{H}_2\text{O}_{(l)} \rightleftharpoons \text{H}_3\text{O}^{+}_{(aq)} + \text{F}^{-}_{(aq)}$





يُحدد نوع المحلول الناتج من تفاعل المعايرة

Determine the type of solution resulting from the titration reaction

20) Which of the following salts will produce a **basic** solution when dissolved in water?

- a. barium chloride BaCl_2
- b. ammonium sulfate $(\text{NH}_4)_2\text{SO}_4$
- c. potassium iodide KI
- d. sodium nitrite NaNO_2

السؤال الإضافي الأول - حساب ثابت الاتزان

First bonus question

21) Which of these properties describes a system that reaches chemical equilibrium?

- a. the reaction takes place in an open system
- b. all reactants and products are present in similar physical state
- c. all reactants and products are present in constant dynamic motion
- d. the temperature changes

السؤال الإضافي الثاني - حساب المولارية

Second bonus question

22) What is the molarity of a solution of $\text{Ba}(\text{OH})_2$ if 1900 mL of it is equivalent in a titration to 260 mL of a solution of 0.5 M HNO_3 ?

- a. 0.017 M
- b. 0.034 M
- c. 0.068 M
- d. 0.0085 M



Answers

| | | | | | | | | | |
|----|---|----|---|----|---|----|---|----|---|
| 1 | c | 2 | d | 3 | a | 4 | b | 5 | c |
| 6 | d | 7 | a | 8 | d | 9 | a | 10 | b |
| 11 | d | 12 | c | 13 | d | 14 | a | 15 | c |
| 16 | a | 17 | d | 18 | c | 19 | b | 20 | d |
| 21 | c | 22 | b | | | | | | |

