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## حل مراجعة عامة وفق الهيكل الوزاري

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## التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم



## روابط مواد الصف الثاني عشر المتقدم على تلغرام

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## المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة كيمياء في الفصل الثاني

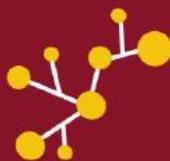
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|--|---|
| <a href="#">مراجعة عامة وفق الهيكل الوزاري</a>               | 1 |
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# CHEMISTRY

## 12 Advanced

Mr. Hesham Eltoukhy

EOT 2 Revision



2023-2024





## EOT 2 Coverage Revision 2023-2024

CHM.5.3.04.001.02 يحدد خصائص محاليل الأحماض والقواعد (المذاق - أثرها على الكواشف - الملمس - تفاعلاتها - التوصيل الكهربائي)

CHM.5.3.04.001.02 List five general properties of aqueous bases and acids (taste, color of indicators, how it feels, reactions and electrical conductivity)

1) Which of the following statements describes the properties of solutions

of acids and bases?

a. Acids taste bitter and bases taste sour

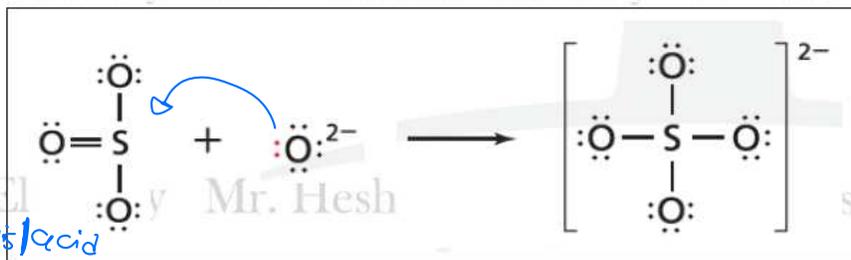
b. Solutions of acids and bases conduct electricity

c. Acid solutions turn litmus paper blue

d. Hydrogen gas is produced by the reaction of solutions of bases with metals

CHM.5.3.04.001.11 يعرف الأحماض والقواعد طبقاً لنظرية لويس

CHM.5.3.04.001.11 Define acids and bases according to Lewis theory

2) What does  $\text{SO}_3$  represent in the following reaction?

a. Lewis base, it donates a pair of electrons

b. Lewis base, it accepts a pair of electrons

c. Lewis acid, it donates a pair of electrons

d. Lewis acid, it accepts a pair of electrons





CHM.5.3.04.006.01 يحدد ثابت تأين الحمض الضعيف  $K_a$  عند كتابة تعبير ثابت التأيّن لمختلف الأحماض الضعيفة

CHM.5.3.04.006.01 Define acid ionization constant,  $K_a$ , while writing the ionization constant expression for different weak acids

3) What is the  $K_a$  value of a 0.1 M HCNO solution and  $pOH = 11.0$ ?

a.  $1.01 \times 10^{-5}$

b.  $1.01 \times 10^{-12}$

c.  $1.0 \times 10^{-21}$

d.  $1.0 \times 10^{-10}$

$$pH = 3 \quad H = 1 \times 10^{-3}$$

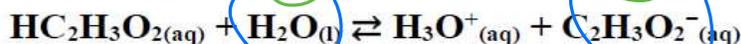
$$K_a = \frac{(1 \times 10^{-3})^2}{0.1 - 1 \times 10^{-3}}$$

$$K_a = 1.01 \times 10^{-5}$$

CHM.5.3.04.003.04 يتعرف العلاقة بين قوة الحمض وقاعدته المرافقة وقوة القاعدة وحمضها المرافق

CHM.5.3.04.003.04 Identify the relationship between the strength of an acid and its conjugate base and the strength of a base and its conjugate acid

4) For the following balanced reaction, which of the following statements is correct?



a

weak

strong

Left

a. The equilibrium lies far to the right because the base  $\text{C}_2\text{H}_3\text{O}_2^-$  is weak, and the conjugate base  $\text{H}_2\text{O}$  is strong

b. The equilibrium lies far to the left because the base  $\text{C}_2\text{H}_3\text{O}_2^-$  is weak,

and the conjugate base  $\text{H}_2\text{O}$  is strong

c. The equilibrium lies far to the right because the base  $\text{C}_2\text{H}_3\text{O}_2^-$  is strong, and the conjugate base  $\text{H}_2\text{O}$  is weak

d. The equilibrium lies far to the left because the base  $\text{C}_2\text{H}_3\text{O}_2^-$  is strong, and the conjugate base  $\text{H}_2\text{O}$  is weak





CHM.5.3.04.003.05 يربط بين قوة القواعد الضعيفة وقيمة Kb وبين قوة الاحماض الضعيفة وقيمة Ka

CHM.5.3.04.003.05 Relate the strength of weak bases to the numerical values of Kb and the strength of weak acids to the numerical values of

5) Which of the following statements is **correct** regarding the following bases ionization equations?

| Base        | Ionization Equation   | $K_b$ (298 K)                   |
|-------------|---|---------------------------------|
| Ethylamine  | $C_2H_5NH_2(aq) + H_2O(l) \rightleftharpoons C_2H_5NH_3^+(aq) + OH^-(aq)$ | Greatest $5.0 \times 10^{-4}$ 4 |
| Methylamine | $CH_3NH_2(aq) + H_2O(l) \rightleftharpoons CH_3NH_3^+(aq) + OH^-(aq)$     | + $4.3 \times 10^{-4}$ 3        |
| Ammonia     | $NH_3(aq) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$             | - $2.5 \times 10^{-5}$ 2        |
| Aniline     | $C_6H_5NH_2(aq) + H_2O(l) \rightleftharpoons C_6H_5NH_3^+(aq) + OH^-(aq)$ | Least $4.3 \times 10^{-10}$ 1   |

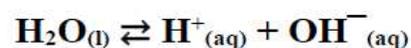
- a. Ethylamine is the least electrically conductive base
- b. Methylamine is weaker than ammonia
- c. Aniline is the base that contains the fewest ions when ionized
- d. The concentrations of ions resulting from the ionization of aniline are greater than the concentrations of the ions resulting from the ionization of ammonia

CHM.5.3.04.007.01 يستخدم Kw في حساب تركيز أيونات الهيدروجين والهيدروكسيد عند درجة حرارة ثابتة والعكس

CHM.5.3.04.007.01 Use Kw to calculate the hydronium ion and hydroxide ion concentration at a given temperature and vice versa

6) In the following equilibrium equation for pure water:

Why does the value of  $K_w$  not change



when other hydrogen ions added to water?

- a. shifting the equilibrium to the right and increasing the concentration of  $H^+$  ions
- b. increasing the rate of ionization of water molecules
- c. increasing the concentration of  $OH^-$  ions in the solution
- d.  $H^+$  reacts with  $OH^-$  to form more  $H_2O$  molecules





CHM. 5.3.04.007.02 يستخدم ثابت تأين الماء لحساب تركيز أيونات الهيدرونيوم والهيدروكسيد والرقم الهيدروجيني والرقم الهيدروكسيمي في المحاليل المائية

CHM.5.3.04.007.02 Describe the relation between pH and pOH and perform calculations involving this relation

7) What is the value of  $[\text{OH}^-]$  and pOH in a solution whose concentration of  $\text{H}^+$  is  $4 \times 10^{-5} \text{ M}$ ?

| choice | $[\text{OH}^-]$                 | pOH  |
|--------|---------------------------------|------|
| a.     | $2.5 \times 10^{-10} \text{ M}$ | 9.60 |
| b.     | $1 \times 10^{-10}$             | 10.0 |
| c.     | $2.5 \times 10^{-9} \text{ M}$  | 8.60 |
| d.     | $1 \times 10^{-9} \text{ M}$    | 9.0  |



CHM.5.3.04.006.03 يربط بين حمضية وقاعدية المحاليل المائية وتركيز أيونات الهيدروجين والهيدروكسيد عند 25 C أو 298 K

CHM.5.3.04.006.03 Relate the acidity and basicity of an aqueous solution to the hydronium and hydroxide ion concentration and pH at 25°C or K 298

8) How many times more acidic is solution A than solution B?

a. 100

b. 10

c. 1

d. 1000

| pH | Solution المحلول |
|----|------------------|
| 1  | A                |
| 3  | B                |

10<sup>2</sup>

1/100



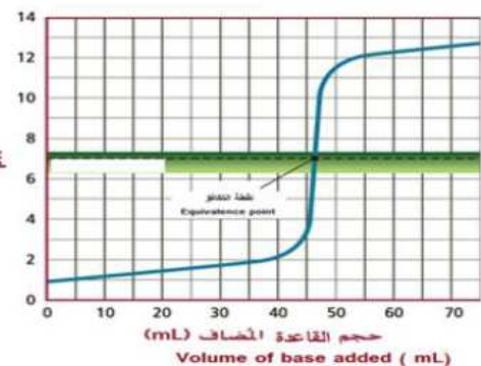


CHM.5.3.04.009.01 يصف منحنيات المعايرة لأنواع مختلفة من الأحماض والقواعد استنادًا إلى قيمة الرقم الهيدروجيني وطبيعة المحلول عند نقطة التكافؤ، نوع الكاشف المستخدم والتغير الذي يحدث في لونه والحجم المضاف من محلول المعايرة واللازم لتغيير لون الكاشف

CHM.5.3.04.009.01 Describe the titration curves of different acids and bases with respect to pH and nature of solution at equivalence point indicator used and its color change and volume of titrant needed for changing color of indicator

9) Which of the following statements is **correct** according to the titration curve and indicator table shown below?

| Indicator                | Range                |
|--------------------------|----------------------|
| Bromothymol blue         | 6.0 – 7.6            |
| <del>Methyl red</del>    | <del>4.2 – 6.2</del> |
| <del>Methyl orange</del> | <del>3.2 – 4.6</del> |



a. The acid and the base are strong, and bromothymol blue is the suitable indicator

~~b. The acid is strong, and the base is weak, and methyl red is the suitable indicator~~

~~c. The acid and the base are weak, bromothymol blue is the suitable indicator~~

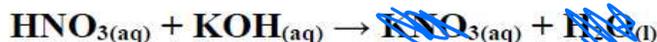
~~d. The acid is weak, and the base is strong, methyl orange is the suitable indicator~~

CHM.5.3.04.004.06 بحسب مولارية (تركيز) المحلول وحجم المحلول المضاف باستخدام بيانات المعايرة

CHM.5.3.04.004.06 Calculate the molarity (concentration) and volume of a solution using titration data

10) What is the molarity of a nitric acid solution if 43.33 mL of a 0.1000 M KOH

is needed to neutralize 20.00 mL of the acid solution?



a. 0.830 M

b. 0.462 M

c. 0.560 M

d. 0.217 M

$$\frac{mV}{n} = \frac{mV}{n}$$

| HNO <sub>3</sub> | KOH       |
|------------------|-----------|
| M =              | M = 0.1   |
| V = 20           | V = 43.33 |
| n = 1            | n = 1     |

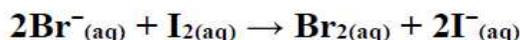




CHM.5.3.05.001.04 يميز بين الأكسدة والاختزال استنادًا إلى التغير في أعداد التأكسد

CHM.5.3.05.001.04 Distinguish between oxidation and reduction in terms of change in oxidation number

11) In the reaction represented by the equation below.

Which of the following is **correct**?

- ~~a.~~ The iodine receives electrons from the bromide ions, and it is oxidized
- b.** The iodine receives electrons from the bromide ions, and it is reduced
- c. The bromide ions receive electrons from the iodine, and it is oxidized
- ~~d.~~ The bromide ions receive electrons from the iodine, and it is reduced

CHM.5.3.05.001.08 يتعرف العامل المؤكسد والعامل المختزل في تفاعل أكسدة واختزال

CHM.5.3.05.001.08 Identify oxidizing agent and reducing agent in a redox reaction

12) In the general equation below, if you know that the reactant X is an oxidizing agent.

Which of the following describe it **correctly**?

|   |   |
|---|---|
| 1 | Gains electrons - its oxidation number increases - it is the oxidized |
| 2 | Loses electrons - its oxidation number increases - it is the oxidized |
| 3 | Gains electrons - its oxidation number decreases - it is the reduced  |
| 4 | Loses electrons - its oxidation number decreases - it is the reduced  |

a. 1

b. 2

c. 3

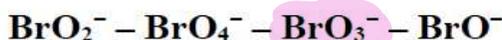
d. 4





CHM.5.3.05.001.02 يحدد عدد تأكسد العنصر في مركب

CHM.5.3.05.001.02 Define oxidation number of a compound

13) Which of the following substances has an oxidation number of **bromine** = +5?a.  $\text{BrO}_2^-$ 

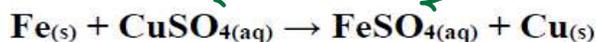
3      7      5      1

b.  $\text{BrO}_3^-$ c.  $\text{BrO}_4^-$ d.  $\text{BrO}^-$ 

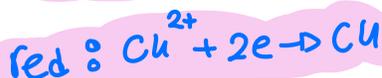
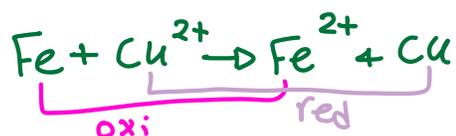
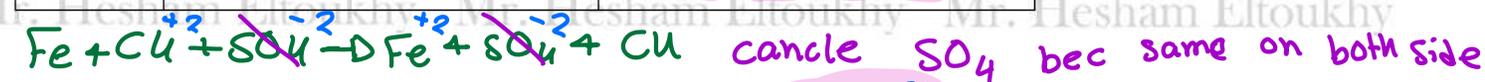
CHM.5.3.05.001.10 يكتب نصف تفاعل الأكسدة ونصف تفاعل الاختزال لتفاعل أكسدة واختزال

CHM.5.3.05.001.10 Write oxidation-half reaction and reduction-half reaction for a redox reaction

14) What are the two redox half-reactions of the following redox reaction?



| choice | Oxidation half-reaction                       | Reduction half-reaction                       |
|--------|---|---|
| a.     | $\text{Cu} \rightarrow \text{Cu}^{2+} + 2e^-$ | $\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe}$ |
| b.     | $\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe}$ | $\text{Cu} \rightarrow \text{Cu}^{2+} + 2e^-$ |
| c.     | $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$ | $\text{Fe} \rightarrow \text{Fe}^{2+} + 2e^-$ |
| d.     | $\text{Fe} \rightarrow \text{Fe}^{2+} + 2e^-$ | $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$ |



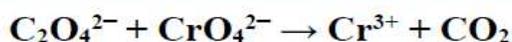


CHM.5.3.05.002 يزن التفاعلات الكيميائية بطريقة التفاعلات النصفية في المحلول الحمضي

CHM.5.3.05.002 Balance redox reaction using half-reaction method in acidic solution

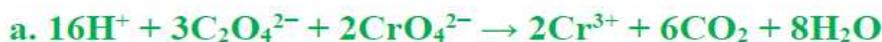
15) What is the balanced equation for the following redox equation?

(using half-reaction method, in **acidic** solution)

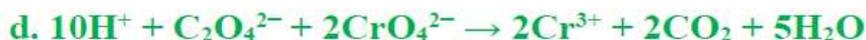


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CHM.5.3.05.002.05 يزن تفاعلات الأكسدة والاختزال في محلول قاعدي

CHM.5.3.05.002.05 Balance redox reaction in basic medium using half-reaction method

16) When balancing equations for redox reactions in a **basic** solution. What is done in the **last** step in the balancing method?

a. Hydrogen ions ( $\text{H}^+$ ) and water molecules are added to either side of the equation

b. Hydroxide ions ( $\text{OH}^-$ ) and water molecules are added to either side of the equation

c. The numbers of atoms only balanced in both sides of the equation

d. Adjusting the coefficients so that the number of electrons lost in oxidation equals the number of electrons gained in reduction

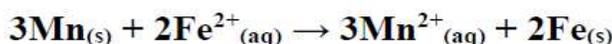




CHM.5.3.05.007.02 يتعرف مكونات الخلية الجلفانية(الفلونبية)- الأتود - الكاتود - الفنترة الملحية - الأسلاك - الإلكتروليت ويوضح دور كل مكون عند بدء التفاعل ويحدد اتجاه سريان الإلكترونات

CHM.5.3.05.007.02 Identify components of a voltaic or galvanic cell (anode, cathode, salt bridge, wires, electrolyte compartments); while explaining the role of each component, when does the reaction start and determining the direction of electron and current flow

17) Which of the following **correctly** describes the voltaic cell shown in the reaction below?



|   |   |
|---|---|
| 1 | The mass of the Mn electrode increases during voltaic cell working              |
| 2 | Anode reaction: $2\text{Fe} \rightarrow 2\text{Fe}^{2+} + 2\text{e}^{-}$        |
| 3 | A salt bridge allows ions to pass from one side to the other                    |
| 4 | Electrons move from the Mn electrode to the Fe electrode through the metal wire |

a. 1, 2 only

b. 1, 4 only

c. 3, 4 only

d. 2, 3 only

CHM.5.3.05.007.05 يستخدم جهود الاختزال القياسية لأصناف التفاعل لحساب جهد الخلية ويحدد ما إذا كان التفاعل يسير تلقائياً أم لا

CHM.5.3.05.007.05 Use the half-cell standard reduction potentials to calculate the electrochemical cell standard potential, while determining whether the redox reactions are spontaneous or non-spontaneous

18) What is the cell potential for the following balanced redox reaction, and is the reaction spontaneous or not?

|                                  |   |  |
|----------------------------------|---|--|
| cell reaction تفاعل الخلية       | $2\text{Al}^{3+}_{(aq)} + 3\text{Cu}_{(s)} \rightarrow 3\text{Cu}^{2+}_{(aq)} + 2\text{Al}_{(s)}$ |  |
| reduction potential جهد الاختزال | $E_{\text{Al}}^{\circ} = -1.662 \text{ V}$<br><i>cathode</i>                                      | $E_{\text{Cu}}^{\circ} = +0.341 \text{ V}$<br><i>anode</i> |

| choice | $E_{\text{cell}}^{\circ} \text{ (V)}$ | Reaction spontaneity |
|--------|---------------------------------------|----------------------|
| a.     | -1.321                                | spontaneous          |
| b.     | +1.321                                | non-spontaneous      |
| c.     | -2.003                                | non-spontaneous      |
| d.     | +2.003                                | spontaneous          |

*Cathode - anode*  
 $= -1.662 - 0.341$   
 $= -2.003$   
*NON Spontaneous*

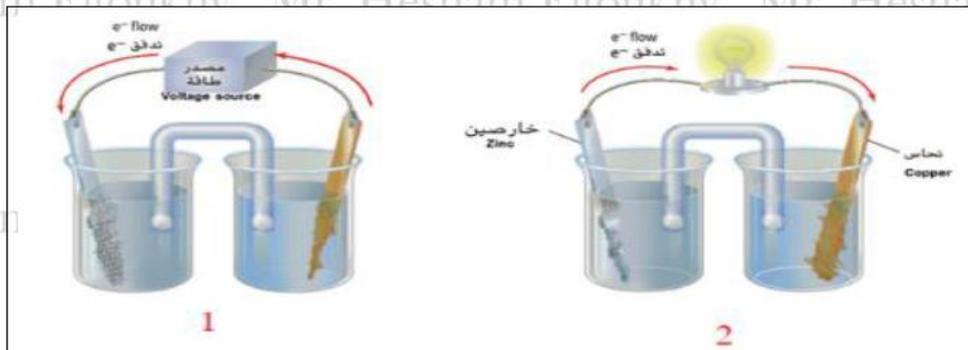




CHM.5.3.05.011.03 يقارن بين الخلية الإلكتروليتية والخلية الفولتية ، موضحاً أين يحدث كل من تفاعل الأكسدة والاختزال عند الأقطاب واتجاه سريان الإلكترونات وتلقائية حدوث التفاعل او عدم تلقائية حدوثه

CHM.5.3.05.011.03 Compare between electrolytic cell and voltaic cell in terms of identifying where will reduction and oxidation processes take place, anode, cathode, direction of electron flow and current flow and spontaneity of the reaction occurring

19) Regarding the two cells in the figure below. Which of the following is **correct**?



Cell 1 is voltaic and converts chemical energy to electrical energy

Cell 2 is electrolytic and converts chemical energy to electrical energy

The reaction in cell 1 is spontaneous

d. The reaction continues in cell 2 until the zinc strip is used up and then the reaction stops

CHM.5.3.05.011.05 يتعرف عملية الطلاء بالكهرباء ويصف كيف تعمل خلية الطلاء، ويتعرف الأقطاب والكاثود ونوع الإلكتروليت المطلوب حسب الفلز المراد استخدامه لطلاء جسم ما

CHM.5.3.05.011.05 Define electroplating while describing how it works, identifying anode, cathode and electrolyte needed for an electrolytic cell in which a selected metal is to be plated on an object

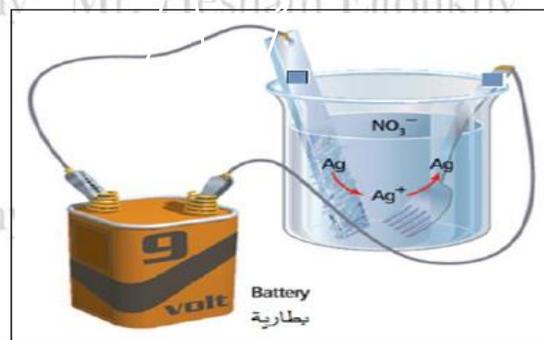
20) Objects are electroplated when a uniform coating is deposited as a protective or decorative layer, as shown in the figure below. Which of the following is **correct**?

a. The metal used for coating is the cathode

b. Silver is oxidized to silver ions at the cathode

c. Silver is oxidized to silver ions at the anode

d. The object to be plated is the anode



this is for 12Adv not 11Adv





## Answer Key

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

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