

Chemistry Final Exam

End Of Term 2 Grade 12 Advanced

Chapter 3 - Acids and Bases

Chapter 4 - Redox Reactions

Chapter 5 - Electrochemistry

2022 - 2023

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Q.1: Salt Solution

Potassium fluoride salt KF dissociates in solution as:



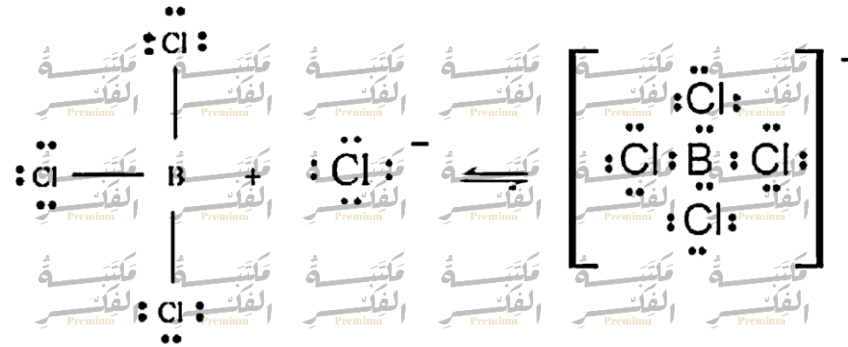
Which of the following is **correct** in relation to salt solution?

	pH	Reason
A	Less than 7	Because the K^{+} ions react with water, but the F^{-} ion is a strong Bronsted-Lowery base do not react with water
B	More than 7	Because the K^{+} ions do not react with water, but the F^{-} ion is a weak Bronsted-Lowery base react with water
C	Equals 7	Because the K^{+} ions do not react with water, the F^{-} ion is a strong Bronsted-Lowery base do not react with water
D	Equals 0	Because the K^{+} ions react with water, the F^{-} ion is a weak Bronsted-Lowery base react with water



Q.2: The Lewis Model

Why does BCl_3 represent Lewis's acid in the following reaction?



- a) Because it is proton acceptor from the base Cl^-
- b) Because it is an electron pair donor to the base Cl^-
- c) Because it is proton donor to the base Cl^-
- d) Because it is an electron pair acceptor from the base Cl^-



Q.3: Strengths of Acids and Bases

Which of the following is **correct** in relation to the reaction below?



A	The equilibrium lies far to the left because the base NH_3 is weak, and the conjugate base OH^- is strong
B	The equilibrium lies far to the right because the base NH_3 is weak, and the conjugate base OH^- is strong
C	The equilibrium lies far to the left because the base NH_3 is strong, and the conjugate base OH^- is weak
D	The equilibrium lies far to the right because the base NH_3 is strong, and the conjugate base OH^- is weak



Q.4: Using Standard Reduction Potentials



Which of the following half-reactions represents the strongest **reducing agent**?

	Half-Reaction	E° (V)
A	$\text{Na}^+ + \text{e}^- \rightleftharpoons \text{Na}$	-2.71
B	$\text{Mn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Mn}$	-1.185
C	$\text{Cr}^{3+} + 3\text{e}^- \rightleftharpoons \text{Cr}$	-0.744
D	$\text{Fe}^{2+} + 2\text{e}^- \rightleftharpoons \text{Fe}$	-0.447



Q.5: Calculation of K_a

What is the value of K_a of 0.0400 M solution of acid HClO_2 with $\text{pH} = 1.80$?

a) 5.8×10^{-3}

b) 1.0×10^{-2}

c) 2.6×10^{-4}

d) 4.9×10^{-9}



Q.6: Balancing Redox Equations

Which of the following is the balanced equation for the reaction below in an acidic solution?



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Q.7: Molarity From Titration Data

What is the molarity of H_2SO_4 solution if 74.30 mL of 0.4388 M NaOH solution is needed to neutralize 45.78 mL of the acid solution?



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a) 0.3561 M

b) 0.1569 M

c) 0.4211 M

d) 0.2320 M

Q.8: Conjugate Acids and Bases

Which of the following is **not** a conjugate acid-base pair?



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Q.9: Hydrogen ions and pH

What is the correct ascending order according to the pH value for each of the following solutions?

Household ammonia $\text{pOH} = 2.10$	Lemon juice $\text{pH} = 2.37$	Milk of magnesia $[\text{H}^+] = 3.2 \times 10^{-4}$	Milk $[\text{H}^+] = 3.2 \times 10^{-7}$
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Q.10: Hydrogen ions and pH

Which of the following aqueous solutions is acidic? (Concentrations at 298 K)

Solution A	Solution B	Solution C	Solution D
$[H^+] = 1.0 \times 10^{-13}$	$[OH^-] = 1.0 \times 10^{-7}$	$[H^+] = 1.0 \times 10^{-7}$	$[H^+] = 4.0 \times 10^{-4}$

a) Solution A

b) Solution B

c) Solution C

d) Solution D



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Q.11: The Standard Hydrogen Electrode

Which of the following is true for the standard hydrogen electrode shown in the figure?



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- a) The standard reduction potential (E°) of the hydrogen electrode is defined as 1.104 V
- b) The standard reduction potential (E°) of the hydrogen electrode is defined as 0.000 V
- c) It will be a cathode when connected to $\text{Cu} | \text{Cu}^{2+}$ electrode
- d) It will be an anode when connected to $\text{Zn} | \text{Zn}^{2+}$ electrode



Q.12: Acid Properties

Which of the following chemical equations represents a reaction between the aqueous solution of an acid and metal hydrogen carbonate?



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Q.13: Determining Oxidation Numbers

In which of the following formulas does the oxidation number of oxygen differ than in the other formulas?

NO	NO ₂	H ₂ O	H ₂ O ₂
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a) NO

b) NO₂c) H₂Od) H₂O₂

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Q.14: Increasing and Decreasing Functions

Which of the following statements is true for the titration curve and the table of indicators shown below?

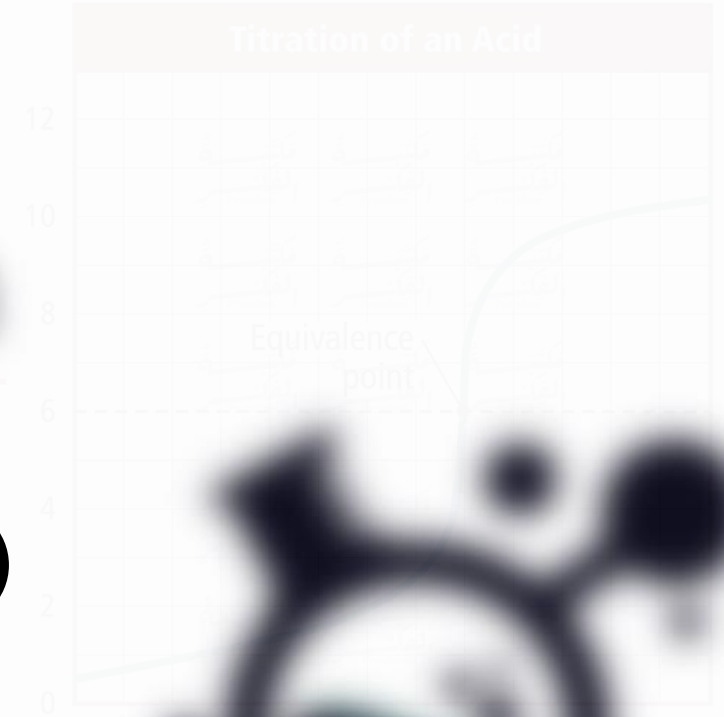
Indicator	pH Range
Phenolphthalein	8.2 - 10.0
Bromocresol Purple	5.2 - 6.8



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- The base is KOH and phenolphthalein is the suitable indicator
- The base is NH_4OH and bromocresol purple is the suitable indicator
- The base is KOH and bromocresol purple is the suitable indicator
- The base is NH_4OH and phenolphthalein is the suitable indicator



Q.15: Strengths of Acids

Regarding the figure shown, which of the following is correct?

a) CH_3COOH is a strong acid and completely ionizes in aqueous solution

b) The number of ions in HCl solution is less than the number of ions in CH_3COOH solution

c) The number of ions in HCl solution is less than the number of ions in CH_3COOH solution

d) HCl is a weak acid and only partially ionizes in aqueous solution



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Q.16: Properties of Acids and Bases

Which of the following statements is correct regarding the following ionization equations?

Acid	Ionization Equation	K_a (298 K)
Hydrosulfuric, 1 st ionization	$\text{H}_2\text{S} \rightleftharpoons \text{H}^+ + \text{HS}^-$	8.9×10^{-8}
Hydrosulfuric, 2 nd ionization	$\text{HS}^- \rightleftharpoons \text{H}^+ + \text{S}^{2-}$	1.0×10^{-19}



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- The acids in both ionizations are weak acids
- The acid in the second ionization is a strong acid
- The acid in the second ionization is weaker than the acid in the first ionization
- The acid in the second ionization is stronger than the acid in the first ionization

Q.17: Voltaic Cell

In the figure shown, what do the two half-cells need so that you can convert chemical energy into electrical energy?

- a) Connect the zinc and copper strips with a metal wire.
- b) Connect the zinc and copper strips with a salt bridge.
- c) Connect the zinc and copper strips with a salt bridge and a metal wire.
- d) Connect the zinc and copper strips with a salt source, and a metal wire.



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Q.18: Redox Reactions

In the reaction represented by the equation below, which of the following is correct?



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Q.19: Electrochemistry

Which of the following is true?

a) In cell 2 the reaction is spontaneous

b) In cell 1 the reaction continues until the Zn strip is used up and then the reaction

c) 2 is an electrolytic cell and converts chemical energy to electrical energy

d) 1 is an electrolytic cell and converts electrical energy to chemical energy



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Q.20: #####

#####?

a) #####

b) #####

c) #####

d) #####

Will be added as possible!



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Objects are electroplated when a uniform coating is deposited as a protective or decorative layer. The figure shows a key being electroplated with copper in an electrolytic cell. What is incorrect about the electroplating process shown in the figure below?

1. The connection of the battery poles
2. The electrolyte used does not contain Cu^{2+}
3. The key was not connected to a light bulb

- a) 1
- b) 2
- c) Both 1 and 2
- d) Both 1 and 3

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Q.22: #####

Bonus

#####?

a) #####

Will be added as possible!

b) #####

c) #####

d) #####



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