

Mock-Chem12 T3 L3 E

## Chemistry: Grade 12

**90 minutes**



مجلس أبوظبي للتعليم  
Abu Dhabi Education Council  
Education First التعليم أولاً

ADEC Examinations 2016-2017

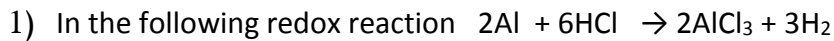
Read these instructions first:

1. Complete the box above.
2. Write in blue pen.
3. The exam paper contains (6) pages.
4. Read each question well and give one answer only.
5. The mark between [ ] refers to question's mark.
6. For MC questions, circle the symbol of the correct answer, and if you would like to change your answer later cross the wrong answer and circle the new one.
7. For the open-ended questions, write your answer on the line or the space provided.
8. All diagrams are approximately drawn.

**Question 1:**

**Multiple Choice**

Identify the letter of the choice that best completes the statement or answer the question (1-10)



The change in the oxidation number for the reduced element is:

- a) +1
- b) -1
- c) +3
- d) -3

[ 2 ]

2) The oxidation number of hydrogen in Sodium Hydride (NaH) is:

- a) +1
- b) -1
- c) +2
- d) -2

[ 2 ]

Use the following table to answer the questions (3-4):

Reduction potential $E^\ominus$ ( V )	
+1.18	$Pt^{2+} + 2e^- \rightarrow Pt$
-0.28	$Co^{2+} + 2e^- \rightarrow Co$
-0.744	$Cr^{3+} + 3e^- \rightarrow Cr$
-1.185	$Mn^{2+} + 2e^- \rightarrow Mn$

3) Which of the following elements is easily oxidized:

- a) Pt
- b) Co
- c) Cr
- d) Mn

[ 2 ]

4) Which of the following represents the right formula for the voltaic cell:

- a)  $Co/Co^{2+} // Mn^{2+}/Mn$
- b)  $Pt/Pt^{2+} // Cr^{3+}/Cr$
- c)  $Cr/Cr^{3+} // Co^{2+}/Co$
- d)  $Pt/Pt^{2+} // Mn^{2+}/Mn$

[ 2 ]

5) In the alkyl halide, as the size of the halogen atom increases:

- a) Both the boiling point and the density of the alkyl halide increase
- b) The boiling point of the alkyl halide increases and its density decreases
- c) The boiling point of the alkyl halide decreases and its density increases
- d) The boiling point of the alkyl halide decreases and its density decreases

[ 2 ]

- 6) The result of the reaction between the alkyl halide and the basic solution is: [ 2 ]
- Ether
  - Alcohol
  - Amine
  - Aryl halide
- 7) The organic compound that provides a nonstick surface for many kitchen items is: [ 2 ]
- Chlorofluorocarbon
  - Polytetrafluoroethene
  - Cyclohexanol
  - Glycerol
- 8) The halogenation equation of the following is: [ 2 ]
- $C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$
  - $CH_3(CH_2)_6CH_2Br + NH_3 \rightarrow CH_3(CH_2)_6CH_2NH_2 + HBr$
  - $CH_3CH_2Cl + OH^- \rightarrow CH_3CH_2OH + Cl^-$
  - $C_2H_4 + H_2 \rightarrow C_2H_6$
- 9) The property which does not apply to ethers comparing with alcohols is: [ 2 ]
- Less polarity
  - Less solubility in water
  - Higher boiling points
  - Higher evaporation
- 10) The organic compounds which are responsible for the characteristic bad smell of dead animals are: [ 2 ]
- Aryl halides
  - Alcohols
  - Amines
  - Ethers
- 11) Match the description of uses in Column B to the correct term in Column A by writing the number for description into the space in front of the term. [ 5 ]

COLUMN A Terms	COLUMN B Descriptions
( ) Aniline	1. Solvent for paints
( ) Methanol	2. In refrigerators and air conditioning systems
( ) Ethanol	3. Anesthetic in surgery
( ) Ethyl ether	4. Producing dyes
( ) 1,2,3-propanetriol	5. Antiseptic
	6. Antifreeze in air planes fuel

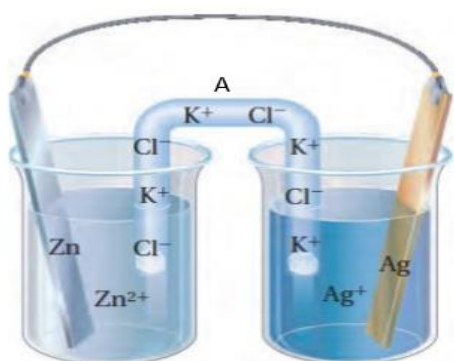
Question 2:

12) Match the correct number from column B to the correct term in column A.

[ 12 ]

COLUMN A		COLUMN B
( )	Electric current	1. The number of electrons lost or gained by an atom when an ionic compound is formed.
( )	Functional group	2. A substance loses electrons and its oxidation number increases.
( )	Standard hydrogen electrode	3. The process of flow of charged particles in voltaic cell.
( )	Replacement	4. An atom or group of atoms that always reacts in a certain way and produces a substance which differs in the properties from the parent hydrocarbon.
( )	Oxidation number	5. Standard electrode used by chemists to measure the reduction potential of all other electrodes.
( )	Oxidation	6. One atom or group of atoms in a molecule is replaced by another atom or group of atoms.
( )		7. The loss of electrons from a reacting substance.

Use the voltaic cell diagram and the table given below to answer the questions (13-15).



Reduction potentials $E^\ominus$ ( V )	
+0.7996	$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$
-0.7618	$\text{Zn}^{+2} + 2\text{e}^- \rightarrow \text{Zn}$

13) Identify the anode in this cell-----

[ 2 ]

14) What is the function of the part labeled (A) in the diagram?

[ 2 ]

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15) Calculate the standard Reduction potential.

[ 3 ]

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16) Describe the role of the oxidizing agent in redox reactions.

[ 3 ]

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17) **Interpret:** Solubility of ethanol in water is higher than the solubility of methyl ether although both molecular weights are equal.

[ 3 ]

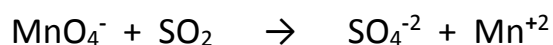
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**Question 3:**

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18) Use the half-reaction method to balance the following redox equation (in acidic solution):

[ 8 ]



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19) Write the following general formulae in the table below:

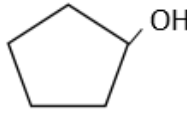
[ 3 ]

Type of the organic compound	Amines	Ethers	Alkyl halide
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General formula			
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20) Name the following organic compounds in in the table below:

[ 6 ]

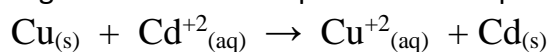
Molecular structure of the organic compound	$  \begin{array}{ccccc}  & \text{H} & \text{H} & \text{H} & \\  &   &   &   & \\  \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\  &   &   &   & \\  & \text{H} & \text{F} & \text{Br} &   \end{array}  $		$\text{CH}_3\text{CH}_2\text{CH}_2\text{-O-CH}_2\text{CH}_3$
Name			

Use the following standard reduction potentials to answer the questions (21-23):

Reduction potentials $E^\circ$ ( V )	
+0.3419	$\text{Cu}^{+2} + 2e^- \rightarrow \text{Cu}$
-0.4030	$\text{Cd}^{+2} + 2e^- \rightarrow \text{Cd}$
-1.662	$\text{Al}^{+3} + 3e^- \rightarrow \text{Al}$

Expect whether or not the following redox reaction is spontaneous. Explain your answer.

[ 4 ]



Expectation: -----

Explanation: -----

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21) Write the overall reaction in the voltaic cell (Copper-Aluminum)

[ 2 ]

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22) When using salt bridge containing sodium nitrate ( $\text{NaNO}_3$ ) in the voltaic cell (Cadmium-Aluminum), in which direction ions move?

[ 2 ]

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Question 4:

23) Write the structural formula of the organic compounds in the table below:

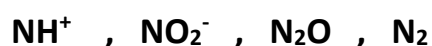
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[ 6 ]

Name	Chlorobenzene	1-Butanol	Methyl amine
structural formula			

25) Arrange in order of increasing oxidation number of Nitrogen:

[ 4 ]



The order: 1- ----- 2- ----- 3- ----- 4- -----

Explain the following questions (26-28):

26) This equation does not represent a redox reaction:  $\text{LiOH} + \text{HNO}_3 \rightarrow \text{LiNO}_3 + \text{H}_2\text{O}$

[ 3 ]

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27) Flow of electrons through the wire from one electrode to another in the voltaic cell.

[ 3 ]

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28) The carbon chain must be numbered when naming the substituted organic compounds.

[ 3 ]

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29) The molecular formula  $\text{C}_3\text{H}_8\text{O}$  represents alcohol and ether, draw three possible isomers. [ 6 ]

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