

Chemistry Exam (A)

1) The role of coke in a blast furnace is similar to that of natural gas in a Midrex furnace. Which of the following explains this statement?

- a) Both of them are used as catalysts to reduce time consumed in reduction process.
- b) Both of them are used to prepare the reducing agent.
- c) Both of them are used as a reducing agent.
- d) Both of them are used as fuel to operate the furnaces at high temperatures.

2) Calculate the degree of dissociation for a weak monoprotic acid with concentration 0.01 M and pH=5

- a) 0.05
- b) 0.001
- c) 0.01
- d) 0.005

3) If 3 Faradays are required to deposit 1 mole of metal (X^{+x}). What is the chemical formula of metal oxide?

- a) XO_2
- b) XO
- c) X_2O_3
- d) No suitable answer

4) Dilute Hydrochloric acid added to a solution containing equal concentrations of Fe^{2+} , Ca^{2+} , Pb^{2+} , and Cu^{2+} . Which one of these cations would precipitate.

- a) Cu^{2+}
- b) Fe^{2+}
- c) Pb^{2+}
- d) Ca^{2+}

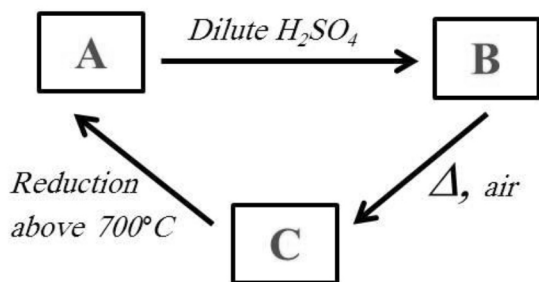
5) Which of the following considered a tertiary monohydric alcohol.

- a)
$$H_3C-C(H_2)-C(H_2)-C(H_2)-OH$$
- b)
$$H_3C-C(H_2)-C(H)(OH)-CH_3$$
- c)
$$H_3C-C(H)(OH)-C(CH_3)_2-CH_3$$
- d)
$$H_3C-C(H_2)-C(CH_3)(OH)-CH_3$$

6) Which of the following happens upon closing the Galvanic cell circuit.

- a) Anions move toward the Anode through the porous septum
- b) Cations move toward the Anode through the porous septum
- c) Electrons move through the external wire from the + rode toward the r -ve rod
- d) Electrons move through the external wire from the cathode toward the anode

11) Study the following diagram , then Find out A, B and C



- a) A: Fe , B: FeSO₄ , C: Fe₂O₃
 b) A: Fe , B: Fe₂(SO₄)₃ , C: Fe₂O₃
 c) A: FeCl₃ , B: FeSO₄ , C: Fe₂O₃
 d) A: Fe₂O₃ , B: FeSO₄ , C: Fe

12) Dilute Hydrochloric acid could be used to distinguish between.....

- a) Na₂CO₃ and NaHCO₃ b) Na₂SO₄ and NaCl
 c) Na₂SO₃ and NaCl d) Na₃PO₄ and NaI

13) During the reversible reaction, Which of the following represents the graph relating concentration and time ?

- a) The concentration of reactant decreases until it completely consumed.
 b) The concentration of product increases and concentration of reactant decreases until they reach a constant concentration.
 c) The concentration of both reactants & products increase until they reach equilibrium.
 d) There is no change in the concentration of both reactants & products since the beginning of the reaction.

14) How many hours for a current of 5 Ampere strength is needed to precipitate 6.35 g of Copper from Copper sulphate solution, the cathode reaction is:

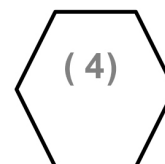
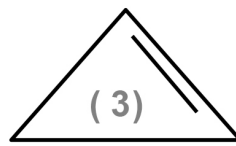


- a) 0.5 h b) 1.07 h c) 1.5 h d) 2.3 h

15) The standard electrode potential, E , is measured under standard conditions. Which of the following is not a standard condition when measuring these values.

- a) Temperature of 298 K (25 C)
- b) Concentration of solution is 1 M
- c) KNO_3 solution in the salt bridge
- d) Measuring against standard Hydrogen electrode

16) These are four cyclic aliphatic hydrocarbons:



The correct arrange of stability of these compounds: (From less stable to more stable)

- a) (2) , (1) , (3) , (4).
- b) (3) , (1) , (4) , (2)
- c) (1) , (3) , (2) , (4)
- d) (3) , (1) , (2) , (4)

17) Calculate the solubility product (K_{sp}) of $\text{Al}(\text{OH})_3$ giving that its degree of solubility equals 10^{-6} mole/liter.

- a) 2.7×10^{-23}
- b) 5.9×10^{-11}
- c) 13.5×10^{-10}
- d) 8.5×10^{-8}

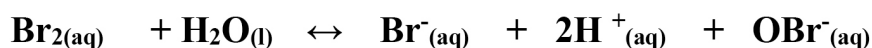
18) Which of the following has the largest number of paired electrons.

- a) ${}_{29}\text{Cu}^{2+}$
- b) ${}_{23}\text{V}^{5+}$
- c) ${}_{29}\text{Cu}^{1+}$
- d) ${}_{24}\text{Cr}^{2+}$

19) Dry distillation of Sodium Propanoate forms.....

- a) C_3H_8
- b) C_2H_6
- c) C_4H_{10}
- d) C_3H_6

24) Considered the following equilibrium system



The aqueous Bromine is characterized by a yellowish-brown colour but the Br^{-} and OBr^{-} are colourless. Thus it is expected that the colour of Bromine will be fade upon the addition of

- (a) H_2SO_4 (b) KOH (c) AgNO_3 (d) KBr

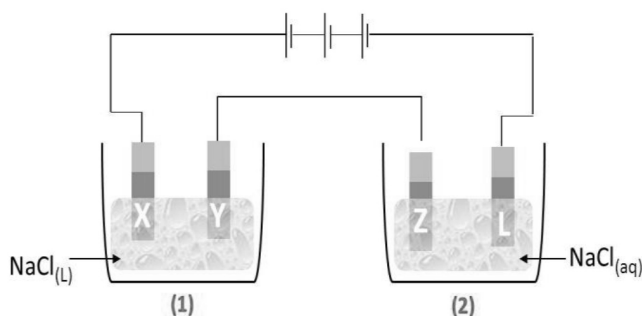
25) Which indicator is not used to differentiate between distilled water and acetic acid solution.

- a) Litmus b) Phenol Phthalein c) Methyl orange d) Bromothymol blue

26) In the opposite diagram:

Cell (1) contains molten Sodium chloride

Cell (2) contains aqueous solution of Sodium chloride



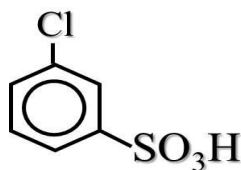
An electrolysis process is made for both of them, the substances formed at the electrodes (X, Y, Z, and L) are

	X	Y	Z	L
a	Cl_2	Na	Cl_2	H_2
b	H_2	Cl_2	Na	Cl_2
c	Cl_2	Na	Na	Cl_2
d	Cl_2	Na	Na	O_2

27) Which of the following occurs upon the addition of 3 moles of Bromine dissolved in CCl_4 to one mole of 2-Butene.

- a) The intensity of red colour of Bromine decreased
 b) The red colour of Bromine water discharged.
 c) The red colour changed into green.
 d) The intensity of red colour remains unchanged.

28) Which of the following choices suitable to prepare the following compound:



- a) Chlorination of benzene then Sulphonation
- b) Sulphonation of Chlorobenzene
- c) Chlorination of benzene sulphonic acid
- d) No suitable answer

29) Calculate the Pressure of Nitrogen for the following equilibrium:



Given: pressure of Hydrogen and Ammonia are 6.8 and 0.4 atm.

- a) 10 atm
- b) 20 atm
- c) 30 atm
- d) 40 atm

30) Which of the following pairs used to detect Lead acetate

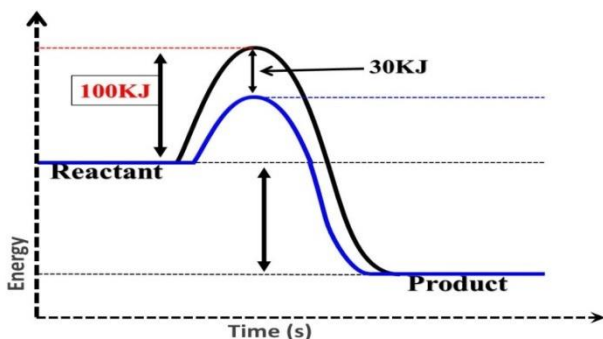
- a) S^{2-} and PO_4^{-3}
- b) Fe^{2+} and SO_4^{-2}
- c) S^{2-} and SO_4^{-2}
- d) NO_2^{1-} and Cl^{-1}

31) In which of the following compounds the oxidation number of Iron not changed when heated in air:

- a) Iron II oxalate
- b) Iron II sulphate
- c) Siderite.
- d) Limonite

32) Study the figure below that show the activation energy before and after using Transition element as catalyst, what's the value of activation energy after using catalyst.

- a) 130 kJ
- b) 30 KJ
- c) 50 kJ
- d) 70 kJ



38) The following table represents the standard reduction potential of four elements A,B,C and D. The galvanic cell produces the highest e.m.f is

Element	A	B	C	D
Standard reduction potential (Volt)	- 2.711	-0.28	+1.2	+2.87

- a) (B) as an anode , (D) as a cathode b) (D) as an anode , (A) as a cathode
 c) (A) as an anode , (D) as a cathode d) (D) as an anode , (C) as a cathode

39) Which of these reactions leads to producing Hydrogen gas with faster rate:

- a) Zinc powder with (2M) HCl. b) Zinc strip with (2M) HCl.
 c) Zinc powder with (1M) HCl. d) Zinc strip with (1M) HCl.

40) Which of the following statements compare between two d-block elements is correct.

- a) Titanium is denser than Nickel but has a smaller atomic radius.
 b) Titanium is less dense than Nickel but has a larger atomic radius.
 c) Titanium is denser than Nickel and has a larger atomic radius.
 d) Titanium is less dense than Nickel and has a smaller atomic radius.

41) Which of the following is the preferred Iron ore for extraction in a blast furnace.

- a) Siderite b) Magnetite c) Limonite d) Hematite

42) The number of alcoholic isomers of the molecular formula $C_4H_{10}O$ equals

- a) 2 isomers b) 3 isomers c) 4 isomers d) 5 isomers

43) From the properties of fuel cells.....

- a) Consumed by time.
 b) Supplied with external source of electricity.
 c) Store electrical energy as chemical anode and cathode material.
 d) Oxygen gas reduced at cathode of fuel cell.

- 6) During Haber-method to prepare Ammonia: $N_{2(g)} + 3H_{2(g)} = 2NH_{3(g)}$. Which of the following conditions are suitable to increase amount ammonia ?
- Increasing pressure and adding Zinc powder
 - Decreasing pressure and adding Iron powder
 - Increasing pressure and adding Iron powder.
 - Decreasing pressure and adding Zinc powder
- 7) Which of the following processes does not aim to improve the physical and mechanical properties of iron ore.
- Sintering process
 - Roasting process
 - Crushing process
 - Concentrating process
- 8) Which of the following alloys its elements are chemically combined.....
- Alloys used in heating coils and electric furnaces
 - Alloys used in real way tracks
 - Cementite
 - Bauxite
- 9) Oxygen converter is charged with
- Hematite
 - Carbon dioxide
 - Molten Iron
 - Iron III Oxide
- 10) Reactions of Iron with acids depend on
- Type of acid and its amount
 - Amount of acid and its concentration
 - Type of acid and its concentration
 - Basicity of acid and its amount

11) One of iron compounds (X) when heated in air, a solid substance (B) is formed along with two different gases, one of them turbid clear lime water. Which of the following statements best compare between (X) and (B).

- a) X is diamagnetic substance while B is paramagnetic one.
- b) X is paramagnetic substance while B is diamagnetic one.
- c) X has magnetic moment more than that of B.
- d) X has magnetic moment less than that of B.

12) Which of the following salts when heated becomes insoluble in water

- a) NaHCO_3
- b) $(\text{NH}_4)\text{HCO}_3$
- c) $\text{Ca}(\text{HCO}_3)_2$
- d) KHCO_3

13) Which of the following is the chemical formula for the basic radical whose salt solution forms a white precipitate when dilute Sulfuric acid added to it.

- a) Cu^{2+}
- b) Fe^{2+}
- c) Ca^{2+}
- d) Al^{3+}

14) Which of the following could act as a standard solution for the determination of Ammonium hydroxide.....

- a) Ammonium chloride
- b) Ammonium carbonate
- c) Hydrochloric acid
- d) Sodium carbonate

15) What is the mass of the precipitate produced from the addition of 100 mL of a 0.1 M Sodium hydroxide solution to an excess of Iron (II) sulfate.

[$\text{NaOH} = 40 \text{ g/mol}$ and $\text{Fe}(\text{OH})_2 = 90 \text{ g/mol}$]

- a) 0.005 g
- b) 0.900 g
- c) 0.760 g
- d) 0.450 g

16) Which of the following is correct to detect the sulphite anion ?

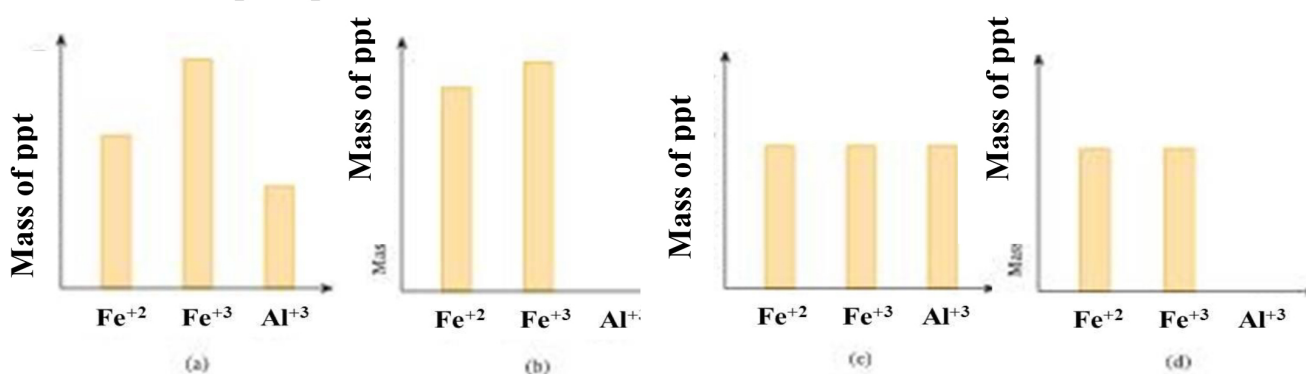
- a) Adding an equal volume of dilute HCl, followed by heating, which results in production of a gas that turns filter paper soaked in acidified aqueous KMnO_4 from purple to colorless
- b) Adding an equal volume of dilute NaOH, followed by heating, which results in production of a gas that turns moist litmus paper blue

- c) Adding an aqueous Ammonia solution, which produces a yellow precipitate
- d) Adding an equal volume of Acetic acid, followed by Silver nitrate, which gives a white precipitate

17) Which of the following used to differentiate between two separated solid salts of Barium Sulphate and Barium Phosphate

- a) Concentrated Sulphuric acid.
- b) Concentrated Ammonia solution.
- c) Acidified Potassium permanganate.
- d) Dilute HCl.

18) On adding excess amount of Sodium hydroxide to three different solutions containing equal amount of Fe^{+2} , Fe^{+3} and Al^{+3} , respectively. Three different precipitates are formed. Which of the following diagrams expresses the ratio between the mass of the precipitate ?



19) Dissolving 18.5 g of Calcium hydroxide in 0.5 L Nitric acid (2 molar) , so the resulting solution will be [Ca(OH)₂ = 74 g/mol]

- (a) Neutral (b) Acidic (c) Alkaline (d) Amphoteric

20) An hydrated metal salt has the chemical formula $\text{XBr}_2 \cdot 6\text{H}_2\text{O}$. When

a 4.578 g sample of the salt is heated, the sample decreases in mass by 1.515 g.

Which of the following is the identity of metal X. [Br=80, H=1, O=16]

- a) Mn [M=55g/mol] b) V [M=51 g/mol]
- c) Cu [M=63.5 g/mol] d) Co [M=58.35 g/mol]

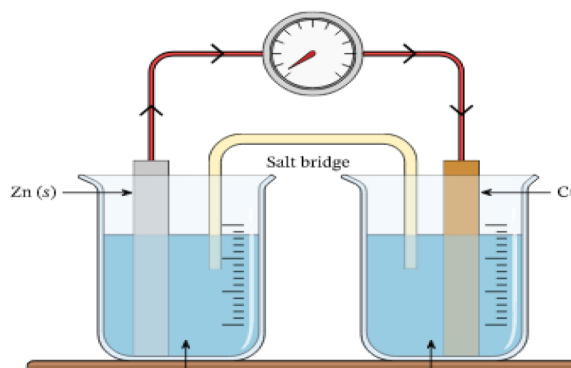
21) Calculate the volume of evolved Chlorine when passing 19300 Coulombs in a solution of Copper II chloride between two Platinum electrodes.

- a) 11.2 L b) 22.4 L c) 2.24 L d) 1.12 L

22) Consider the figure below:

What may cause the electric current to stop flowing.

- a) The full consumption of the Cu^{2+} ions
 b) Removing the salt bridge
 c) The full consumption of the Cu electrode
 d) Bot (a) and (b) are correct.



23) If you know that , the standard reduction potentials of
 (Ni = -0.23 V) , (Fe = -0.41V) , (Cu = +0.34 V) , (Al = -1.67 V)

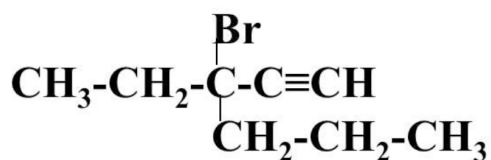
- a) Copper oxidized aluminum and doesn't oxidize iron
 b) Nickel reduced iron and doesn't reduce copper
 c) Aluminum oxidized iron and doesn't oxidize copper
 d) Iron oxidized aluminum and reduced Nickel

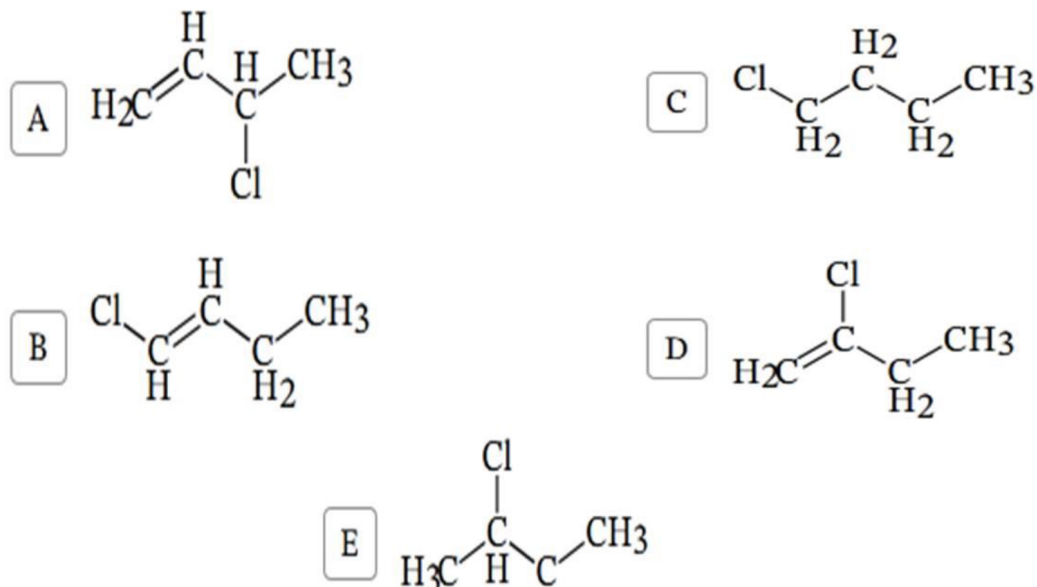
24) You have oxidation potentials of some elements, which of them is the best reducing agents ?

- a) 3 Volts b) 2.3 Volts c) zero Volt d) - 2.8 Volts

25) The IUPAC name of the following compound is :

- a) 3-Bromo Hexene
 b) 4-Bromo Hexene.
 c) 3-Bromo-3-Propyl Hex-4-ene
 d) 3-Bromo-3-Ethyl Hexyne

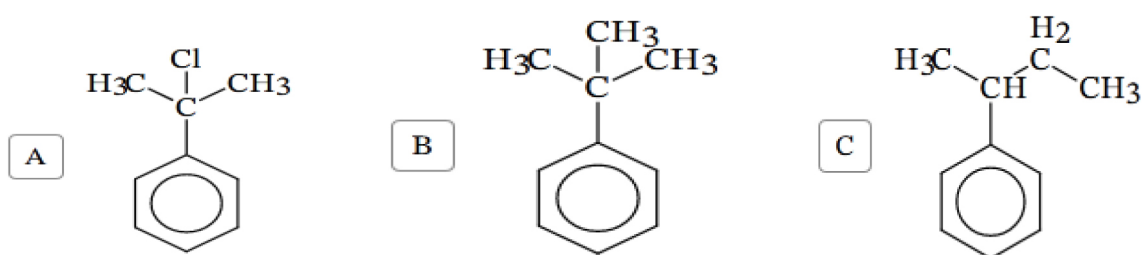
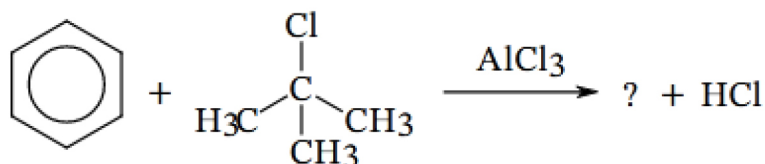




31) Which of the following is correct in, Burning Ethyne gas in atmospheric air

- Carbon dioxide completely formed.
- Forming smoky flam.
- Forming highly thermal flam.
- Carbon monoxide totally forming Carbon dioxide.

32) Which of the following is the correct product for the following reaction?

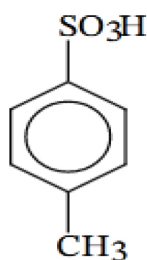


33) Which of the following consecutive combinations will lead to obtaining cyclohexane from normal hexane.

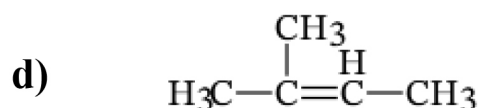
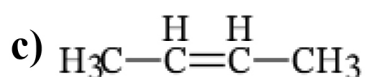
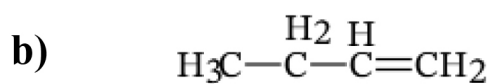
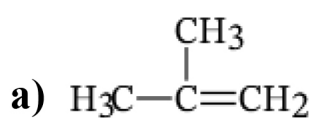
- Catalytic reforming followed by Oxidation
- Polymerization followed by Reduction
- Polymerization followed by Oxidation
- Catalytic reforming followed by Reduction

34) Which two compounds would react to give the following compound?

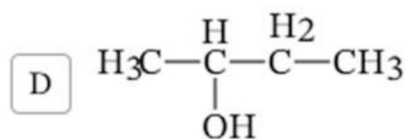
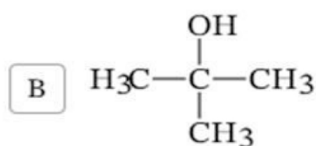
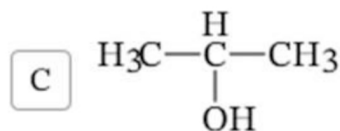
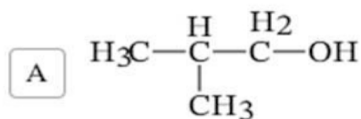
- a) Benzene and Sulfur dioxide
- b) Benzene and Sulfuric acid
- c) Toluene and Sulfuric acid
- d) Toluene and Hydrogen sulfide



35) Which of the following alkenes is a possible product upon the dehydration of one mole of 1-butanol



36) Alkaline hydrolysis of tertiary butyl Iodide, gives.....



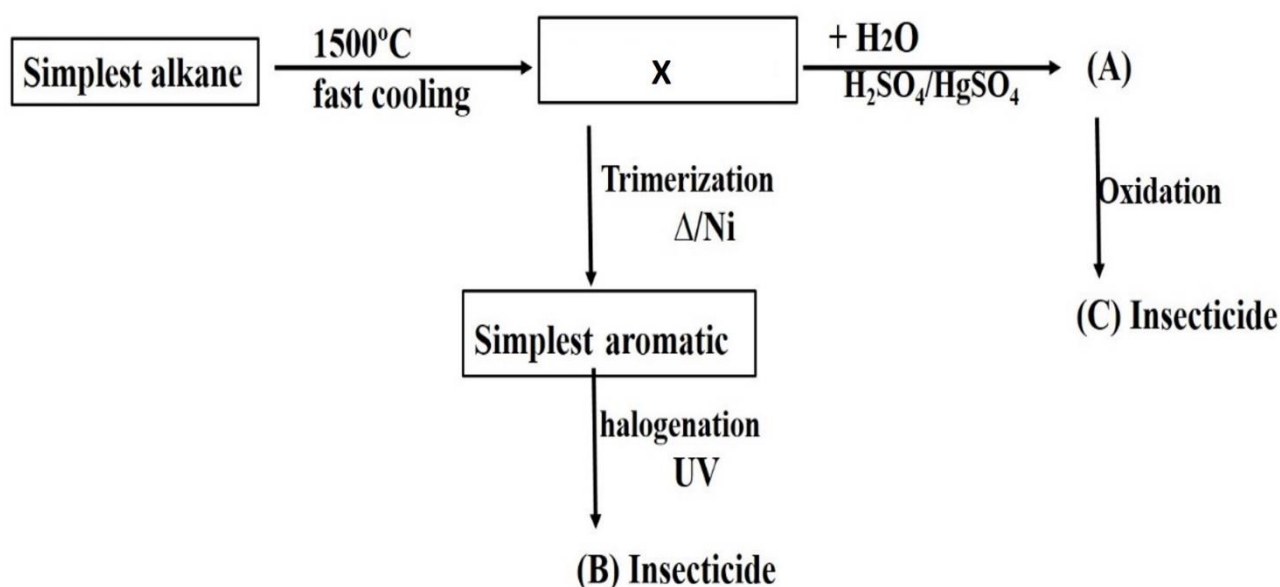
37) Which of the compounds has the lowest boiling point.

- a) 1,3-Propan-diol ($\text{C}_3\text{H}_8\text{O}_2$)
- b) 1-Propanol ($\text{C}_3\text{H}_8\text{O}$)
- c) Ethyl Methanoate ($\text{C}_3\text{H}_6\text{O}_2$)
- d) Propanoic acid ($\text{C}_3\text{H}_6\text{O}_2$)

44) (A) and (B) are two Aliphatic compounds, compound (A) produced from acidic hydrolysis of Aspirin while compound (B) used in condensation reaction to prepare Dacron fibers

- Acetic acid, Ter Phthalic acid
- Salicylic acid, Ter Phthalic acid
- Acetic acid, Ethylene glycol
- Salicylic acid, Ethylene glycol

45) *Essay: Study the following figure:*



-What are the names of compounds (B) and (C)

-What is the name of compound produced from reduction of (A)

-Write the polymer obtained from adding 1 mole of HCl to Compound X.

46) What is the similarity and difference between copper and zinc ions in CuCl and ZnSO₄ respectively.