UNIT 3 & 4 CHEMISTRY QUIZ

QUESTION 1

A drop of concentrated Fe^{3+} is added to the following equilibrium mixture and constant temperature:

$$Sn^{2+}_{(aq)} + 2Fe^{3+}_{(aq)} \rightleftharpoons Sn^{4+}_{(aq)} + 2Fe^{2+}_{(aq)}$$

Which of the following statements is correct?

A While equilibrium is being re-established, the rate of the forward reaction increases.

B While equilibrium is being re-established, the rate of the forward reaction decreases.

C The equilibrium constant at the end of the reaction will be different from that at the beginning of the reaction.

D The total number of ions decreases.

QUESTION 2

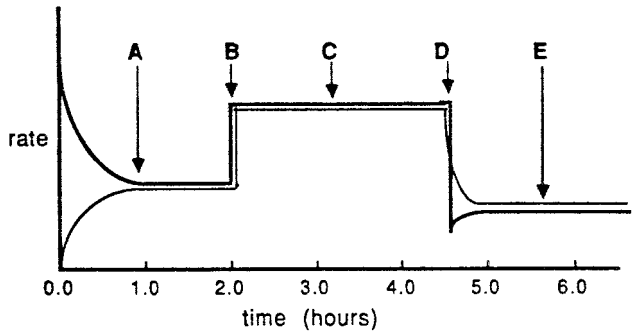
The graph below shows the variation in the reaction rates for the following reactions:

$H_{2(g)} + I_{2(g)} \rightarrow 2HI_{(g)}$ (Heavy Line)

$2HI_{(g)} \rightarrow H_{2(g)} + I_{2(g)}$ (Light Line)

Which of the following changes was introduced at the 4.5 hour mark?

A A catalyst was added.
B The temperature was increased.
C The temperature was decreased.
D HI was removed.



QUESTION 3

The equilibrium constant for the reaction below at 25^oC is $1.7\times10^{-10}\ M^{-2}$.

$AgCl_{(s)} \rightleftharpoons Ag^{+}_{(aq)} + Cl^{-}_{(aq)}$

Which of the following answers represents the equilibrium constant at 50^oC?

A $2\times1.7\times10^{-10}\ M^{-2}$

B $\frac{1}{2}\times1.7\times10^{-10}\ M^{-2}$

C $\left(1.7\times10^{-10}\right)^2\ M^{-2}$

D K cannot be determined from the information provided

QUESTION 4

The standard half cell potentials of some metal ion/metal systems are given below.

Species	E^o (*Volts*)
$Au^{3+}_{(aq)} / Au_{(s)}$	$+1.29$
$Ba^{2+}_{(aq)} / Ba_{(s)}$	-2.90
$Cu^{2+}_{(aq)} / Cu_{(s)}$	$+0.34$
$Fe^{2+}_{(aq)} / Fe_{(s)}$	-0.44

Which species in this list would spontaneously react with copper ions to form copper metal?

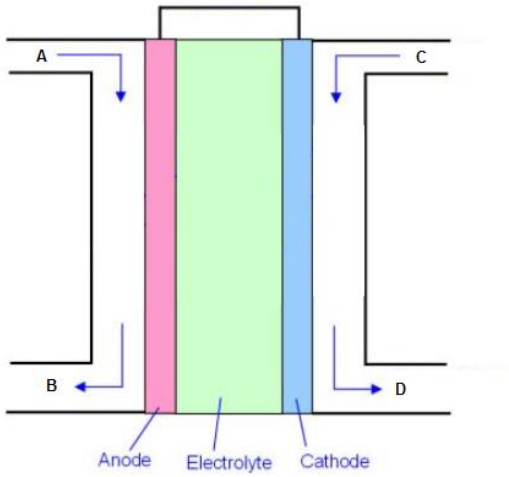
A $Fe_{(s)}$

B $Au_{(s)}$

C $Fe_{(s)}$ and $Ba_{(s)}$

D $Au_{(s)}$ and $Ba_{(s)}$

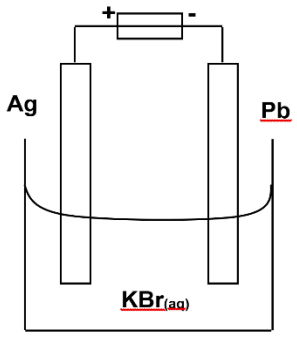
QUESTION 5
The diagram below shows the structure of a molten carbonate fuel cell.



The mole of electrons consumed at the cathode would be:

A 4 mol
B Double the mole produced at the anode.
C Half the mole produced at the anode.
D The same as the mole produced at the anode.

QUESTION 6
Consider the following electrolytic cell.
The reaction that occurs at the anode is



A $Pb_{(s)} \rightarrow Pb^{2+}_{(aq)} + 2e^-$
B $Ag_{(s)} \rightarrow Ag^{+}_{(aq)} + e^-$
C $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^{+}_{(aq)} + 4e^-$
D $2H_2O_{(l)} + 2e^- \rightarrow H_{2(g)} + 2OH^{-}_{(aq)}$

QUESTION 7
Several metals are produced by the electrolysis of molten salts. In one such case a current of $30{,}000\,A$ produced $22.4\,kg$ of metal per hour. Given that the cation of the metal has a valency of $+2$, the metal being produced is

A Calcium
B Bromine
C Magnesium
D Sodium

QUESTION 8
Which of the following bonds are not produced between fluoromethane and water molecules?

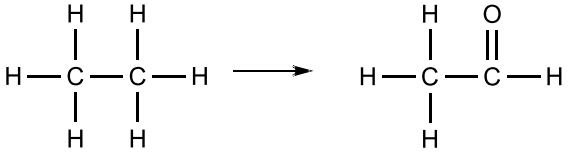
A Dispersion forces
B Dipole-dipole forces
C Ion-dipole bonding
D Hydrogen bonding

QUESTION 9
Which solvent could not be used to dissolve most esters?

A Benzene
B Water
C Carbon tetrachloride (CCl_4)
D Ethanol

QUESTION 10
Which of the following processes represents reduction?

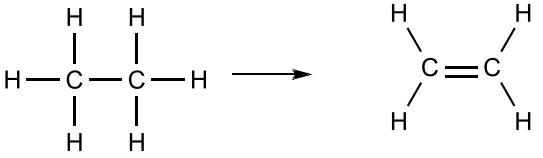
A



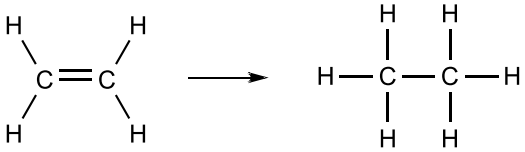
B



C



D



QUESTION 11
A compound introduced into a mass spectrometer gave a spectrum corresponding to fragments including CCl_3^+, CCl_2F^+, CCl_2^+, CCl^+ and CF^+. Which of the following is the most likely formula for the compound?

A CCl_3F

B CCl_2F_2

C $CClF_3$

D $CHClF_2$

QUESTION 12
Which molecule would display the larger retention time in normal phase column chromatography?

A 1-iodo-2,3-dimethylbutane
B 1-iodo-2,3-dimethylhexane
C 2,3-dimethylbutane
D 2,3-dimethylhexane

QUESTION 13
Oxalic acid ($HOOCCOOH$) and ethanoic acid (CH_3COOH) are both weak acids. Nitric acid (HNO_3) is a strong acid. $20.00\,mL$ solutions of $0.10\,M$ concentration of each of these three acids were separately titrated with a $0.10\,M$ solution of sodium hydroxide ($NaOH$). In order to react completely:

A All three acids would require the same amount of $NaOH$.
B HNO_3 would require more $NaOH$ than CH_3COOH but less than $HOOCCOOH$.
C $HOOCCOOH$ and CH_3COOH would require the same amount of $NaOH$ but HNO_3 would require more.
D CH_3COOH and HNO_3 would require the same amount of $NaOH$ but $HOOCCOOH$ would require more.

QUESTION 14
Which of the following statements regarding monosaccharides is incorrect?

A The functional group in monosaccharides is the hydroxy group
B Monosaccharides behave as weak reductants
C Monosaccharides cannot be hydrolysed to produce smaller units
D Monosaccharides can be oxidised to produce smaller units

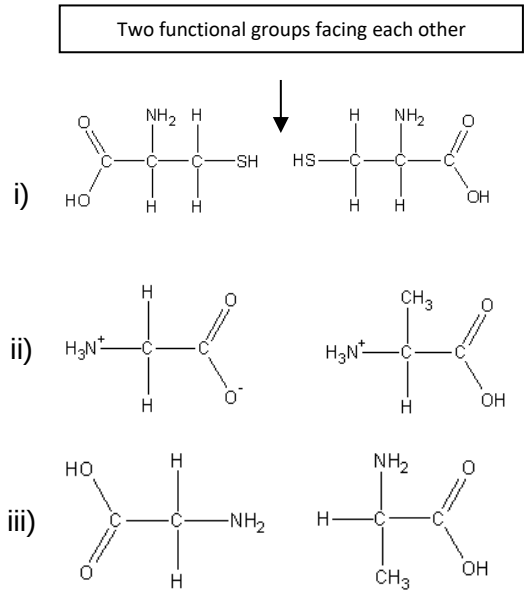
QUESTION 15
Which of the following could represent the products of the hydrolysis of a polyunsaturated fat?

A $C_3H_8O_3$ and $C_{15}H_{31}COOH$
B $C_6H_{12}O_6$ and $C_{15}H_{27}COOH$
C $C_3H_8O_3$ and $C_{15}H_{27}COOH$
D CO_2 and H_2O

QUESTION 16
A certain amino acid contained 40.4% carbon, 7.9% hydrogen and 15.7% nitrogen.
If the balance of the molecule is oxygen, the amino acid is most likely to be

A Alanine
B Cysteine
C Glycine
D Valine

QUESTION 17
The amino acids below are orientated so that two functional groups are facing each other.
Which of these amino acid pairs are oriented so that if they were part of a protein the functional groups would maintain the tertiary structure of the protein?



A i only
B i & ii
C i, ii & iii
D i & iii

ANSWERS

QUESTION 1 Answer is B

QUESTION 2 Answer is C

QUESTION 3 Answer is D

QUESTION 4 Answer is C

QUESTION 5 Answer is D

QUESTION 6 Answer is B

QUESTION 7 Answer is A

QUESTION 8 Answer is C

QUESTION 9 Answer is B

QUESTION 10 Answer is D

QUESTION 11 Answer is A

QUESTION 12 Answer is B

QUESTION 13 Answer is D

QUESTION 14 Answer is B

QUESTION 15 Answer is C

QUESTION 16 Answer is A

QUESTION 17 Answer is A