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## Previous Year Paper

Chemistry - 2009

## : $\exists$ Multiple Choice Questions

1. Given that $\Delta H f(H)=218 \mathrm{~kJ} / \mathrm{mol}$, express the $\mathrm{H}-\mathrm{H}$ bond energy in $\mathrm{kcal} / \mathrm{mol}$.
A. 52.15
B. 911
C. 104
D. 52153

Answer
2. The wavelengths of electron waves in two orbits is 3: 5. The ratio of kinetic energy of electrons will be
A. $25: 9$
B. 5: 3
C. 9: 25
D. 3: 5

Answer
3. Electrons with a kinetic energy of $6.023 \times 10^{4} \mathrm{~J} / \mathrm{mol}$ are evolved from the surface of a metal, when it is exposed to radiation of wavelength of 600 nm . The minimum amount of energy required to remove an electron from the metal atom is
A. $2.3125 \times 10^{-19} \mathrm{~J}$
B. $3 \times 10^{-19} \mathrm{~J}$
C. $6.02 \times 10^{-19} \mathrm{~J}$
D. $6.62 \times 10^{-19} \mathrm{~J}$

Answer
4. Dipole moment of $\mathrm{HCl}=1.03 \mathrm{D}, \mathrm{HI}=0.38 \mathrm{D}$. Bond length of $\mathrm{HCl}=1.3 \mathrm{~A}^{\circ}$ and $\mathrm{HI}=1.6 \mathrm{~A}^{\circ}$. The ratio of fraction of electric charge, $\delta$, existing on each atom in HCl and HI is
A. 12: 1
B. $2.7: 1$
C. 3.3: 1
D. 1: 3.3

Answer
5. $\mathrm{SiCl}_{4}$ on hydrolysis forms ' X ' and HCl Compound ' X ' loses water at $1000^{\circ} \mathrm{C}$ and gives ' Y '. Compounds ' X ' and ' Y ' respectively are

| Chemistry <br> Bjetesion9i | ZIgya |
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Study, Assignments, Solved Previous Year Papers . Questions and Answers. Free Forever. D. $\mathrm{H}_{4} \mathrm{SiO}_{4}, \mathrm{SiO}_{2}$

Answer
6. 1.5 g of $\mathrm{CdCl}_{2}$ was found to contain 0.9 g of Cd . Calculate the atomic weight of Cd .
A. 118
B. 112
C. 106.5
D. 53.25

Answer
7. The average kinetic energy of one molecule of an ideal gas at $27^{\circ} \mathrm{C}$ and 1 atm pressure is
A. $900 \mathrm{cal} \mathrm{K}^{-1} \mathrm{~mol}^{-1}$
B. $6.21 \times 10^{-21} \mathrm{JK}^{-1}$ molecule ${ }^{-1}$
C. $336.7 \mathrm{JK}^{-1}$ molecule ${ }^{-1}$
D. $3741.3 \mathrm{JK}^{-1} \mathrm{~mol}^{-1}$

Answer
8. Assertion (A): K, Rb and Cs form superoxides.

Reason (R): The stability of the superoxides increases from ' $K$ ' to 'Cs' due to decrease in lattice energy.

The correct answer is
A. Both (A) and (R) are true and (R) is the correct explanation of (A).
B. Both $(A)$ and $(R)$ are true but $(R)$ is not the correct explanation of $(A)$
C. (A) is true but (R) is not true
D. $(A)$ is not true but $(R)$ is true

Answer
9. How many 'mL' of perhydrol is required to produce sufficient oxygen which can be used to completely convert 2 L of $\mathrm{SO}_{2}$ gas to $\mathrm{SO}_{3}$ gas?
A. 10 mL
B. 5 mL
C. 20 mL
D. 30 mL

## Answer

10. pH of a buffer solution decreases by 0.02 units when 0.12 g of acetic acid is added to 250 mL of a buffer solution of acetic acid and potassium acetate at 27 C . The buffer capacity of the solution is
A. 0.1
B. 10

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11. Which one of the following order is correct for the first ionisation energies of the elements?
A. $\mathrm{B}<\mathrm{Be}<\mathrm{N}<\mathrm{O}$
B. $\mathrm{Be}<\mathrm{B}<\mathrm{N}<\mathrm{O}$
C. $\mathrm{B}<\mathrm{Be}<\mathrm{O}<\mathrm{N}$
D. $B<O<B e<N$

Answer
12. The cubic unit cell of a metal (molar mass $=63.55 \mathrm{~g} \mathrm{~mol}^{-1}$ ) has an edge length of 362 pm . Its density is $8.92 \mathrm{~g} \mathrm{~cm}^{-3}$. The type of unit cell is
A. primitive
B. face centred
C. body centred
D. end centred

Answer
13. The equilibrium constant for the given reaction is 100 .
$\mathrm{N} 2(\mathrm{~g})+2 \mathrm{O} 2(\mathrm{~g}) \rightleftharpoons 2 \mathrm{NO} 2(\mathrm{~g})$
What is the equilibrium constant for the reaction given below?
$\mathrm{NO} 2(\mathrm{~g}) \rightleftharpoons 12 \mathrm{~N} 2(\mathrm{~g})+\mathrm{O} 2(\mathrm{~g})$
A. 10
B. 1
C. 0.1
D. 0.01

Answer
14. 20 mL of 0.1 M acetic acid is mixed with 50 mL of potassium acetate. $\mathrm{K}_{\mathrm{a}}$ of acetic acid $=1.8 \mathrm{x}$ $10^{-5}$ at 27 C . Calculate concentration of potassium acetate if pH of the mixture is 4.8 .
A. 0.1 M
B. 0.04 M
C. 0.4 M
D. 0.02 M

Answer
15. Calculate $\Delta H^{\circ}$ for the reaction, $\mathrm{Na} 2 \mathrm{O}(\mathrm{s})+\mathrm{SO}(\mathrm{g}) \rightarrow \mathrm{Na} 2 \mathrm{SO} 4(\mathrm{~g})$ given the following: $(\mathrm{A}) \mathrm{Na}(\mathrm{s})+\mathrm{H} 2$ $\mathrm{O}(\mathrm{I}) \rightarrow \mathrm{NaOH}(\mathrm{s})+12 \mathrm{H} 2(\mathrm{~g}) ; \Delta \mathrm{H}^{\circ}=-146 \mathrm{~kJ}(\mathrm{~B}) \mathrm{Na} 2 \mathrm{SO} 4(\mathrm{~s})+\mathrm{H} 2 \mathrm{O}(\mathrm{I}) \rightarrow 2 \mathrm{NaOH}(\mathrm{s})+\mathrm{SO}(\mathrm{g}) ; \Delta \mathrm{H}^{\circ}=+41$ $8 \mathrm{~kJ}(\mathrm{C}) 2 \mathrm{Na} 2 \mathrm{O}(\mathrm{s})+2 \mathrm{H} 2(\mathrm{~g}) \rightarrow 4 \mathrm{Na}(\mathrm{s})+2 \mathrm{H} 2 \mathrm{O}(\mathrm{I}) ; \Delta \mathrm{H}^{\circ}=+259 \mathrm{~kJ}$
A. +823 kJ
B. -581 kJ
C. -435 kJ

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Alkyne $\rightarrow$ Lindlar's catalystH2A $\rightarrow$ Ozonolysis B only
$\leftarrow$ Wacker proc
essCH2 $=\mathrm{CH} 2$
A. $\mathrm{H} 3 \mathrm{C}-\mathrm{C} \equiv \mathrm{C}-\mathrm{CH} 3$
B. $\mathrm{H} 3 \mathrm{C}-\mathrm{CH} 2-\mathrm{C} \equiv \mathrm{CH}$
C. $\mathrm{H} 2 \mathrm{C}=\mathrm{CH}-\mathrm{C} \equiv \mathrm{CH}$
D. $\mathrm{HC} \equiv \mathrm{C}-\mathrm{CH} 2-\mathrm{C} \equiv \mathrm{CH}$

Answer
17. The chemical entities present in thermosphere of the atmosphere are
A. $\mathrm{O} 2+, \mathrm{O}+, \mathrm{NO}+$
B. $\mathrm{O}_{3}$
C. $\mathrm{N} 2, \mathrm{O} 2, \mathrm{CO} 2, \mathrm{H} 2 \mathrm{O}$
D. $\mathrm{O} 3, \mathrm{O} 2+, \mathrm{O} 2$

Answer
18. Match the following.

|  | List I | List II |  |
| :---: | :---: | :---: | :---: |
| (A) | Flespar | (I) | $\left[\mathrm{Ag}_{3} \mathrm{SbS}_{3}\right]$ |
| (B) | Asbestos | (II) | $\mathrm{Al}_{2} \mathrm{O}_{3} \cdot \mathrm{H}_{2} \mathrm{O}$ |
| (C) | Pyrargyrite | (III) | $\mathrm{MgSO}_{4} \cdot \mathrm{H}_{2} \mathrm{O}$ |
| (D) | Diaspore | (IV) | $\mathrm{KAlSi}_{3} \mathrm{O}_{8}$ |
|  |  | $(\mathrm{~V})$ | $\mathrm{CaMg}_{3}\left(\mathrm{SiO}_{3}\right)_{4}$ |

A. (A) (B) (C) (D)

IV V II I
B. (A) (B) (C) (D)

IV V I II
C. (A) (B) (C) (D)

IV I III II
D. (A) (B) (C) (D)

II V IV I
Answer
19. The concentration of an organic compound in chloroform is 6.15 g per 100 mL of solution. A portion of this solution in a 5 cm polarimeter tube causes an observed rotation of $-1.2^{\circ}$. What is Like. Share. Bookmark. Download. Make Notes. Print - Your Favourite Questions. Join www.zigya.com

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C. $-39^{\circ}$
D. $+61.5^{\circ}$

Answer
20. Fluorine reacts with dilute NaOH and forms a gaseous. product $A$. The bond angle in the molecule of $A$ is
A. $104^{\circ} 40^{\prime}$
B. $103^{\circ}$
C. $107^{\circ}$
D. $109^{\circ} 28^{\prime}$

Answer
21. The number of $p \pi-d \pi$ 'pi' bonds present in $\mathrm{XeO}_{3}$ and $\mathrm{XeO}_{4}$ molecules, respectively are
A. 3,4
B. 4,2
C. 2,3
D. 3,2

Answer
22. Which one of the following sets correctly represents the increase in the paramagnetic property of the ions?
A. $\mathrm{Cu}^{2+}>\mathrm{V}^{2+}>\mathrm{Cr}^{2+}>\mathrm{Mn}^{2+}$
B. $\mathrm{Cu}^{2+}<\mathrm{Cr}^{2+}<\mathrm{V}^{2+}<\mathrm{Mn}^{2+}$
C. $\mathrm{Cu}^{2+}<\mathrm{V}^{2+}<\mathrm{Cr}^{2+}<\mathrm{Mn}^{2+}$
D. $\mathrm{V}^{2+}<\mathrm{Cu}^{2+}<\mathrm{Cr}^{2+}<\mathrm{Mn}^{2+}$ Answer
23. The type of bonds present in sulphuric anhydride are
A. $3 \sigma$ and three рп-рп
B. $3 \sigma$, one $р \pi-р \pi$ and two $р \pi-р \pi$
C. $2 \sigma$ and three $p \pi-d \pi$
D. $2 \sigma$ and two $p \pi-d \pi$

Answer
24. Which pair of oxyacids of phosphorus contains ' P - H ' bonds?
A. $\mathrm{H}_{3} \mathrm{PO}_{4}, \mathrm{H}_{3} \mathrm{PO}_{3}$
B. $\mathrm{H}_{3} \mathrm{PO}_{5}, \mathrm{H}_{4} \mathrm{P}_{2} \mathrm{O}_{7}$
C. $\mathrm{H}_{3} \mathrm{PO}_{3}, \mathrm{H}_{3} \mathrm{PO}_{2}$
D. $\mathrm{H}_{3} \mathrm{PO}_{2}, \mathrm{HPO}_{3}$

Answer
B. $\left[\mathrm{Al}\left(\mathrm{H}_{2} \mathrm{O}\right)_{3}(\mathrm{OH})_{3}\right]$
C. $\left[\mathrm{Al}\left(\mathrm{H}_{2} \mathrm{O}\right)_{2}(\mathrm{OH})_{4}\right]$
D. $\left[\mathrm{Al}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right](\mathrm{OH})_{3}$

Answer
26. During the depression in freezing point experiment, an equilibrium is established between the molecules of
A. liquid solvent and solid solvent
B. Iiquid solute and solid solvent
C. liquid solute and solid solute
D. Iiquid solvent and solid solute

Answer
27. Which one of the following is most effective in causing the coagulation of an $\mathrm{As}_{2} \mathrm{~S}_{3}$ sol?
A. KCl
B. $\mathrm{AlCl}_{3}$
C. $\mathrm{MgSO}_{4}$
D. $\mathrm{K}_{3} \mathrm{Fe}(\mathrm{CN})_{6}$

Answer
28. For the following cell reaction, $\mathrm{Ag}|\mathrm{Ag}+|\mathrm{AgCl}| \mathrm{Cl} \Theta| \mathrm{Cl} 2, \mathrm{Pt}_{\mathrm{GG}} \mathrm{f}^{\circ}(\mathrm{AgCl})=-109 \mathrm{~kJ} / \mathrm{mol} \Delta \mathrm{Gf}^{\circ}(\mathrm{Cl} \Theta)=-12$ $9 \mathrm{~kJ} / \mathrm{mol} \Delta \mathrm{Gf}^{\circ}(\mathrm{Ag}+)=78 \mathrm{~kJ} / \mathrm{mo} /$
$E^{\circ}$ of the cell is
A. -0.60 V
B. 0.60 V
C. 6.0 V
D. None of these

Answer
29. At $25^{\circ} \mathrm{C}$, the molar conductances at infinite dilution for the strong electrolytes $\mathrm{NaOH}, \mathrm{NaCl}$ and $\mathrm{BaCl}_{2}$ are $248 \times 10^{-4}, 126 \times 10^{-4}$ and $280 \times 10^{-4} \mathrm{Sm}^{2} \mathrm{~mol}^{-1}$ respectively, $\lambda \mathrm{m} \infty \mathrm{Ba}(\mathrm{OH})_{2}$ in $\mathrm{Sm}^{2} \mathrm{~mol}^{-1}$ is
A. $52.4 \times 10^{-4}$
B. $524 \times 10-4$
C. $402 \times 10-4$
D. $262 \times 10-4$
30. For a first order reaction at $27^{\circ} \mathrm{C}$, the ratio of time required for $75 \%$ completion to $25 \%$ Like. Share. Bookmark. Download. Make Notes. Print - Your Favourite Questions. Join www.zigya.com
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C. 4.8
D. 0.477

Answer
31. One mole of alkene $X$ on ozonolysis gave one mole of acetaldehyde and one mole of acetone. The IUPAC name of $X$ is
A. 2-methyl-2-butene
B. 2-methyl-1-butene
C. 2-butene
D. 1-butene

Answer
32. In Gattermann reaction, a diazonium group is replaced by $X$ using $Y . X$ and $Y$ are

| $X$ | $Y$ |
| :---: | :---: |
| $\mathrm{Cl} \Theta$ | $\mathrm{Cu} / \mathrm{HCl}$ |


| $X$ | $Y$ |
| :---: | :---: |
| $\mathrm{Cl} \oplus$ | $\mathrm{CuCl}_{2} / \mathrm{HCl}$ |


| $X$ | $Y$ |
| :---: | :---: |
| $\mathrm{Cl} \odot$ | $\mathrm{CuCl}_{2} / \mathrm{HCl}$ |


| $X$ | $Y$ |
| :---: | :---: |
| $\mathrm{Cl}_{2}$ | $\mathrm{Cu}_{2} \mathrm{O} / \mathrm{HCl}$ |

Answer
33. What are $X$ and $Y$ in the following reaction sequence?
$\mathrm{C} 2 \mathrm{H} 5 \mathrm{OH} \rightarrow \mathrm{Cl} 2 \mathrm{X} \rightarrow \mathrm{Cl} 2 \mathrm{Y}$
A. $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{Cl}, \mathrm{CH}_{3} \mathrm{CHO}$
B. $\mathrm{CH}_{3} \mathrm{CHO}, \mathrm{CH}_{3} \mathrm{CO}_{2} \mathrm{H}$
C. $\mathrm{CH}_{3} \mathrm{CHO}, \mathrm{CCl}_{3} \mathrm{CHO}$
D. $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{Cl}, \mathrm{CCl}_{3} \mathrm{CHO}$

Answer


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(I) (CHEE $\mathrm{CH} 2 \mathrm{OCO} \rightarrow \triangle \mathrm{A}$ (II) $\mathrm{CH} 3 \mathrm{CO} 2 \mathrm{H} \rightarrow$ Red

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$\mathrm{CH} 3 \mathrm{CO} 2 \mathrm{H} \rightarrow \mathrm{F} 4 \mathrm{O} 10 \mathrm{C}$

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| :---: | :---: | :---: | :---: |
| $\mathrm{C}_{2} \mathrm{H}_{6}$ | $\mathrm{CH}_{3} \mathrm{COCH}_{3}$ | $\left(\mathrm{CH}_{3} \mathrm{CO}_{2} \mathrm{O}\right.$ |


| A | B | $C$ |
| :---: | :---: | :---: |
| $\left(\mathrm{CH}_{3} \mathrm{CO}\right)_{2} \mathrm{O}$ | $\mathrm{C}_{2} \mathrm{H}_{6}$ | $\mathrm{CH}_{3} \mathrm{COCH}_{3}$ |


| A | B | $C$ |
| :---: | :---: | :---: |
| $\mathrm{CH}_{3} \mathrm{COCH}_{3}$ | $\mathrm{C}_{2} \mathrm{H}_{6}$ | $\left(\mathrm{CH}_{3} \mathrm{CO}\right)_{2} \mathrm{O}$ |


| A | B | $C$ |
| :---: | :---: | :---: |
| $\mathrm{CH}_{3} \mathrm{COCH}_{3}$ | $\left(\mathrm{CH}_{3} \mathrm{CO}\right)_{2} \mathrm{O}$ | $\mathrm{C}_{2} \mathrm{H}_{6}$ |

Answer
35. One per cent composition of an organic compound A is, carbon : 85. 71 \% and hydrogen 14.29\%. Its vapour density is 14. Consider the following reaction sequence
$\mathrm{A} \rightarrow \mathrm{Cl} 2 / \mathrm{H} 2 \mathrm{OB} \rightarrow(\mathrm{ii}) \mathrm{H} 3 \mathrm{O}+(\mathrm{i}) \mathrm{KCN} / \mathrm{EtOHC}$
Identify C
A. $\mathrm{CH} 3-\mathrm{CH}(\mathrm{OH})-\mathrm{CO} 2 \mathrm{H}$
B. $\mathrm{HO}-\mathrm{CH} 2-\mathrm{CH} 2-\mathrm{CO} 2 \mathrm{H}$
C. $\mathrm{HO}-\mathrm{CH} 2-\mathrm{CO} 2 \mathrm{H}$
D. $\mathrm{CH} 3-\mathrm{CH} 2-\mathrm{CO} 2 \mathrm{H}$

Answer
36. How many tripeptides can be prepared by linking the amino acids glycine, alanine and phenyl alanine?
A. One
B. Three
C. Six
D. Twelve

Answer
37. A codon has a sequence of $A$, and specifies a particular $B$ that is to be incorporated into a C. What are A, B, C

|  | A | B | C |
| :---: | :---: | :---: | :---: |
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| A | B | $C$ |
| :---: | :---: | :---: |
| 3 base | protein | amino acid |


| A | B | C |
| :--- | :--- | :--- |
| 3 bases | mino acid | protein |

## Answer

38. Parkinson's disease is linked to abnormalities in the levels of dopamine in the body. The structure of dopamine is
A.

B.

C.

.


Answer
39. Consider the following reaction,
$\mathrm{C} 2 \mathrm{H} 5 \mathrm{HCl}+\mathrm{AgCN} \rightarrow \mathrm{EtOH} / \mathrm{H} 2 \mathrm{O} \mathrm{X}$ (major)
Which one of the following statements is true for $X$ ?
(I) It gives propionic acid on hydrolysis
(II) It has an ester functional group
(III) It has a nitrogen linked to ethyl carbon

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Answer
40. The synthesis of crotonaldehyde from acetaldehyde is an example of. $\qquad$ reaction.
A. nucleophilic addition
B. elimination
C. electrophilic addition
D. nucleophilic addition-elimination

Answer

