

## Section 3: Chemistry

41. The number of electrons in an atom with atomic number 105 having  $(n + l) = 8$  are:  
 (a) 30                      (b) 17                      (c) 15                      (d) 18
42. The ratio  $\frac{a}{b}$  (a and b being the van der Waal's constant of real gases) has the dimensions of  
 (a) atm mol<sup>-1</sup>              (b) L mol<sup>-1</sup>              (c) atm L mol<sup>-1</sup>              (d) atm L mol<sup>-2</sup>
43. Resultant molarity of H<sup>+</sup> ion in a mixture of 100 mL of 0.1 M H<sub>2</sub>SO<sub>4</sub> and 200 mL of 0.1 M H<sub>3</sub>PO<sub>3</sub> is:  
 (a) 0.1 M                      (b) 0.2 M                      (c) 0.267 M                      (d) 0.133 M
44. The chemical reaction,  $2O_3 \rightleftharpoons 3O_2$  proceeds as follows:  
 $O_3 \xrightarrow{\text{fast}} O_2 + O$  ... (fast)  
 $O + O_3 \xrightarrow{\text{slow}} 2O_2$  ... (slow)
- The rate law expression should be:  
 (a)  $r = k[O]^2$               (b)  $r = k[O_3]^2[O_2]^{-1}$               (c)  $r = k[O_3][O_2]$               (d) unpredictable
45. For the reaction in equilibrium,  
 $N_2O_4(g) \rightleftharpoons 2NO_2(g)$
- the concentrations, of N<sub>2</sub>O<sub>4</sub> and NO<sub>2</sub> at equilibrium are  $4.8 \times 10^{-2}$  and  $1.2 \times 10^{-2}$  mol L<sup>-1</sup> respectively. The value of K<sub>c</sub> for this reaction is:  
 (a)  $3 \times 10^{-3}$  mol L<sup>-1</sup>      (b)  $3 \times 10^3$  mol L<sup>-1</sup>      (c)  $3.3 \times 10^2$  mol L<sup>-1</sup>      (d)  $3 \times 10^{-1}$  mol L<sup>-1</sup>
46. Which one of the following is tribasic acid?  
 (a) H<sub>3</sub>PO<sub>2</sub>                      (b) H<sub>3</sub>PO<sub>3</sub>                      (c) H<sub>3</sub>PO<sub>4</sub>                      (d) H<sub>4</sub>P<sub>2</sub>O<sub>7</sub>
47. In CsBr crystal structure edge length of unit cell is 4.3 Å. The shortest interionic distance between Cs<sup>+</sup> and Br<sup>-</sup> ions is  
 (a) 3.72 Å                      (b) 1.86 Å                      (c) 7.44 Å                      (d) 4.3 Å

48. Which is deliquescent?

- (a) MgCl<sub>2</sub>                      (b) NaOH                      (c) CaCl<sub>2</sub>                      (d) All

49. For which change  $\Delta H > \Delta U$ ?

- (a)  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$     (b)                       $\text{CH}_4(\text{g}) + 2\text{O}_2 \rightleftharpoons \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$   
(c)  $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$     (d)                       $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

50. Which one of the following is incorrect for spontaneous adsorption of gas on solid surface?

- (a)  $\Delta H$  decreases for system    (b)                       $\Delta S$  (total) increases  
(c)  $\Delta S$  decreases for gas        (d)                       $\Delta G$  increases for system

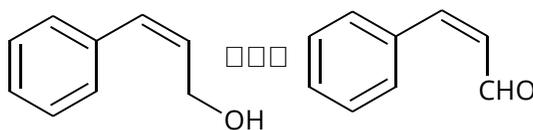
51. According to MO Theory,

- (a)  $\text{O}_2^+$  is paramagnetic and bond order greater than  $\text{O}_2$   
(b)  $\text{O}_2^-$  is paramagnetic and bond order less than  $\text{O}_2$   
(c)  $\text{O}_2^+$  is diamagnetic and bond order is less than  $\text{O}_2$   
(d)  $\text{O}_2^-$  is diamagnetic and bond order is more than  $\text{O}_2$

52. How many chiral compounds are possible on mono chlorination of 2-methyl butane?

- (a) 2    (b)                      4    (c)                      6    (d)                      8

53. Which of the following reagents can be used for the following conversions

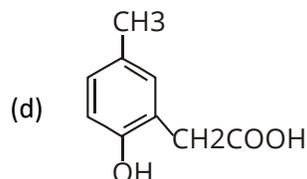
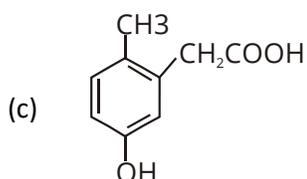
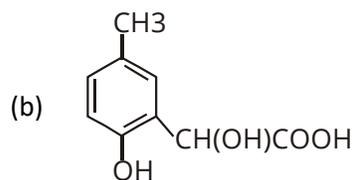
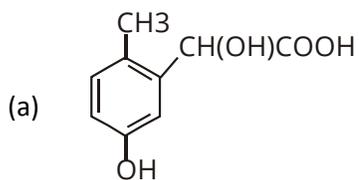


- (a) CrO<sub>3</sub> / Pyridine    (b) H<sub>2</sub>/Pd-C                      (c) LiAlH<sub>4</sub>                      (d) KMnO<sub>4</sub> / OH<sup>-</sup>

54. Which of the following is fully fluorinated polymer?

- (a) Neoprene                      (b) Teflon                      (c) Thiokol                      (d) PVC

55. p-cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form, the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is



56. Which method of purification is represented by the following equation?



- (a) van Arkel                      (b) zone refining                      (c) mond process      (d) cupellation
57. Which of the following has –O–O– linkage
- (a) H<sub>2</sub>S<sub>2</sub>O<sub>6</sub>                      (b) H<sub>2</sub>S<sub>2</sub>O<sub>8</sub>                      (c) H<sub>2</sub>S<sub>2</sub>O<sub>3</sub>                      (d) H<sub>2</sub>S<sub>4</sub>O<sub>6</sub>

58. 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly

- (a) 1-bromo-2-methylbutane                      (b) 2-bromo-2-methylbutane
- (c) 2-bromo-3-methylbutane                      (d) 1-bromo-3-methylbutane

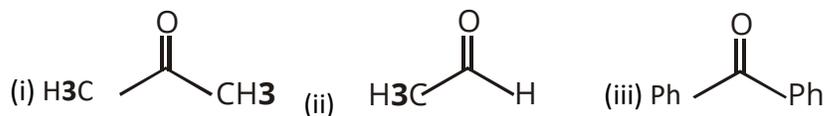
59. Acid catalyzed hydration of alkenes except ethene leads to the formation of

- (a) primary alcohol                      (b) secondary or tertiary alcohol
- (c) mixture of primary and secondary alcohols      (d) mixture of secondary and tertiary alcohols

60. The material used in semiconductors

- (a) Si (b) Sn (c) Ti (d) Cs

61. The order of reactivity of Phenyl Magnesium Bromide with the following compounds is



- (a) (ii) > (iii) > (i) (b) (i) > (iii) > (ii) (c) (ii) > (i) > (iii) (d) all react with same rate

62. Which one of the following types of drugs reduces fever ?

- (a) Analgesic (b) Antipyretic (c) Antibiotic (d) Tranquiliser

63. Tertiary alkyl halides are practically inert to substitution by mechanism because of

- (a) insolubility (b) instability (c) inductive effect (d) steric hindrance

64. Which of the following oxides is amphoteric in character?

- (a) CaO (b)  $\text{CO}_2$  (c)  $\text{SiO}_2$  (d)  $\text{SnO}_2$

65. Among the following acids which has the lowest  $\text{pK}_a$  value ?

- (a)  $\text{CH}_3\text{COOH}$  (b)  $\text{HCOOH}$   
(c)  $(\text{CH}_3)_2\text{CH}-\text{COOH}$  (d)  $\text{CH}_2\text{CHCOOH}$