

Class: 12  
Subject: chemistry  
Topic: Surface Chemistry  
No. of Questions: 20  
Duration: 60 Min  
Maximum Marks: 60

1. Which of the following process does not involve a catalyst

- A. Haber process
- B. Thermite process
- C. Ostwald process
- D. Contact process

Sol: B

2. The reaction  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \xrightarrow{\text{NO}} 2\text{SO}_3(\text{g})$  is an example for

- A. acid base catalysis
- B. homogeneous catalysis
- C. heterogeneous catalysis
- D. auto catalysis

Sol: B

3. Which of the following characteristics of adsorption is wrong?

- A. adsorption in general decreases with temperature
- B. adsorption in general increases with temperature
- C. adsorption is reversible
- D. adsorption takes place only on the surface of the adsorbent

Sol: B

When the type of adsorption is not specified, only physisorption is to be considered since most of adsorptions are of this type. Then option 2 is found to be wrong

4. Assertion (A) The adsorption of a vapour on a clean surface is a spontaneous process.  
Reason (R) Change in the entropy of the process is highly positive.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A).
- B. Both (A) and (B) are true but (R) is not the correct explanation of (A).
- C. (A) is true but (R) is false.
- D. (A) is false but (R) is true.

Sol: B

5. The colouring matter which gets adsorbed on activated charcoal is called

- A. adsorbent
- B. adsorbate
- C. adsorber
- D. none

Sol: B

6. Assertion (A) AgI changes to positively charged colloidal sol in presence of KI.  
Reason (R) It is due to adsorption of I<sup>-</sup> on AgI.

- A. Both (A) and (R) are true and (R) is the correct explanation of (A).
- B. Both (A) and (B) are true but (R) is not the correct explanation of (A).
- C. (A) is true but (R) is false.
- D. (A) is false but (R) is true.

Sol: D

7. In the case of auto catalysis

- A. solvent catalyses
- B. product catalyses
- C. heat produced in the reaction catalyses
- D. reactant catalyses

Sol: B

Auto catalyst is a substance produced during a reaction which it self acts as a catalyst. Example :  
During the titrations using acidified KMnO<sub>4</sub>, MnSO<sub>4</sub> formed as a product acts as an auto catalyst

8. Efficiency of a catalyst depends on

- A. its molecular weight

- B. its solubility
- C. its particle size
- D. none of these

Sol: C

Smaller the size more is the number of active centres exposed and, hence more is the efficiency

9. Formaldehyde and acetaldehyde are manufactured by dehydrogenation  $\text{CH}_3\text{OH}$  and  $\text{C}_2\text{H}_5\text{OH}$  respectively. The catalyst used in this reaction is

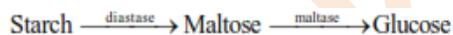
- A.  $\text{H}_2\text{SO}_4$
- B. Copper
- C. nickel
- D.  $\text{Cr}_2\text{O}_3 + \text{ZnO}$

Sol: A

10. The enzyme involved in the conversion of starch into maltose is

- A. maltase
- B. invertase
- C. zymase
- D. diastase

Sol: D



11. In homogeneous catalysis, the rate of the reaction

- A. increases with the increase in the amount of the catalyst
- B. decreases with the increase in the amount of the catalyst
- C. is independent of the amount of the catalyst
- D. decreases with the rise in temperature

Sol: A

$\text{A} \xrightarrow{\text{catalyst}} \text{products}$ . Rate =  $k[\text{A}][\text{catalyst}]$ . Hence option 1 is correct. Thus rate increases with the increase in concentration of the catalyst

12. Example for homogeneous catalysis is

- A. Contact process
- B. Haber's process
- C. Hydrolysis of sucrose
- D. Decomposition of potassium chlorate in the presence of  $MnO_2$

Sol: C

In contact process and Haber's process reactants are gases while catalyst is a solid. In the last case the reactant and the catalyst are solids. Hence it also forms heterogeneous catalysis since any two solids do not form homogeneous system. So option 3 is the choice

13. An inhibitor is

- A. a homogeneous catalysis
- B. a heterogeneous catalyst
- C. a negative catalyst
- D. an auto catalyst

Sol: C

14. When a catalyst is finely divided

- A. the number of active centres increases
- B. the surface area exposed increases
- C. the absorbing capacity increases
- D. all the above statements are correct

Sol: D

15. Identify the process which does not fit in with the rest from the point of view of catalysis

- A. Ostwald's process for the manufacture of  $HNO_3$
- B. Contact process for the manufacture of  $H_2SO_4$
- C. Chamber's process for the manufacture of  $H_2SO_4$
- D. Synthesis of methanol from carbon monoxide and hydrogen

Sol: C

Among the four options the third one is an example of homogeneous catalysis. The rest are example for heterogeneous catalysis

16. Which of the following substance adsorbs hydrogen gas most strongly?

- A. activated carbon
- B. silica gel
- C. platinum black
- D. iron powder

Sol: C

Platinum, platinum black, platinised platinum (platinum coated electrolytically with fresh platinum) have high capacity to absorb hydrogen. Hence then can be used as an electrode material catalyst in reactions, etc.

17. Platinum is used as a catalyst in general for

- A. dehydrogenation reactions
- B. oxidation reactions
- C. dehydration reactions
- D. dehydrohalogenating reactions

Sol: B

Platinum acts as a catalyst for dehydrogenation reaction of alcohols but it acts as a catalyst for a number of oxidation reactions. Hence option 2 is better chosen

18. Which one of the following statements regarding catalysts is not true?

- A. a catalyst remains unchanged in composition and mass at the end of the reaction
- B. a catalyst can initiate a reaction
- C. A catalyst does not alter the equilibrium in a reversible reaction
- D. catalyst is sometimes very specific in respect of a reaction

Sol: B

A catalyst will not initiate a reaction which is not already taking place

19. Potassium metabisulphite used as a food preservative is

- A. a homogeneous catalyst
- B. a heterogeneous catalyst
- C. a positive catalyst
- D. a negative catalyst

Sol: D

Food preservatives decrease the rate of spoiling of food. Hence it is taken as a negative Catalyst

20. An example of autocatalytic reaction is

- A. the decomposition of nitroglycerine
- B. thermal decomposition of  $\text{KClO}_3$  in presence of  $\text{MnO}_2$
- C. Oxidation of  $\text{SO}_2$  to  $\text{SO}_3$
- D. hydrogenation of vegetable oils using nickel catalyst

Sol: A

Oxides of nitrogen formed during the decomposition of nitroglycerine acts as auto catalysts

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