

**CHE6B12; Core Course IX: ADVANCED AND APPLIED CHEMISTRY**  
**Question bank**

*Nanochemistry*

1. In carbon nanotubes carbon atoms are ----- hybridized.
2. STM is .....
3. Give an example for a quantum dot.
4. The football shaped cage like structure of carbon atoms are called .....
5. The collective oscillation of electrons over the surface of a metal with respect to incident light is called .....
6. Write any two uses of nanotubes (2)
7. Discuss the application of nanomaterials in sensors, vehicles and mobile electronic devices (5)
8. Explain with examples Nanomaterials (2.5)
9. Discuss Medical applications of nanomaterials. (5)
10. Explain the application of nanotechnology in biology (5)
11. Describe the application of nanotechnology in catalysis. (5)
12. Write an essay on the applications of nanomaterials (10)

**2017**

13. What happens to the melting point when the particle size of a material approaches to the nanoscale ranges? (2)
14. Write short note on graphene (6)
15. Discuss the optical properties of nanomaterials (6)
16. Discuss the physical and chemical characteristics of nanomaterial (5)

**2018**

17. How do physical characteristics of nanomaterials differ from bulk materials? (2)
18. Quantum dots are examples of zero dimensional nanomaterials. Explain (2)
19. Distinguish between the "bottom-up" and "top-down" methods of nanoscale synthesis of materials (6)
20. Write short notes on Fullerenes (2.5)

**2019**

21. What are Quantum Dots?
22. List the applications of Nano materials in electronics. (2)
23. Discuss briefly Fullerenes with examples (6)
24. Write S.N. on classification of Nano materials (6)
25. Discuss briefly Metal Nano particles and Semi-conductor Nano particles. (5)

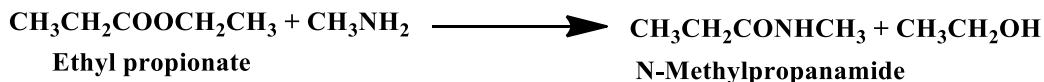
**2020**

26. List the applications of nanomaterials in optics (2)
27. Discuss briefly semiconductor and metal oxide nanoparticles (5)

*New Vistas in Chemistry*

**Green Chemistry**

28. Green chemistry reduces the use and generation of ..... Substance
29. .... coined the term green chemistry
30. MAOS can be expanded as ..... in green chemistry
31. Green synthesis involves .....
- a) Enzymes b) Excess of solvents c) Excess of reagents d) High temperature
32. Green synthesis involves .....
- a) Enzymes b) Minimum solvents c) Minimum reagents d) All the above
33. What is meant by atom economy (2)
34. Calculate the atom economy for the following reaction



35. Explain any eight principles of Green chemistry. (4)
36. Give MW assisted Diels-Alder reaction. (6)
37. Comment on MW and ultrasound assisted green synthesis (5)
38. Discuss the Green and safer alternatives for solvents and auxiliaries in a chemical reaction (5)

**2017**

39. Bromoethane (desired product) and hydrogen bromide (waste product) are obtained by the reaction of ethane and bromine through a substitution reaction. Calculate the % atom economy for the reaction. (2)

40. What are the advantages of microwave assisted organic synthesis? (6)
41. Explain any of the five principles of Green Chemistry. (5)

**2018**

42. Who is credited with establishing the field of Green Chemistry during his time working for the U.S. Environmental Protection Agency as the Chief of the Industrial Chemistry Branch?
43. Explain the phenomenon 'cavitation' associated with sonochemistry. (2)
44. Discuss the Green synthesis of ibuprofen. (6)
45. Discuss the advantages of microwave assisted organic synthesis?

**2019**

46. Explain the twelve principles of Green Chemistry. (5)

**2020**

47. Explain the twelve principles of Green Chemistry. (5)

**Supramolecular Chemistry**

48. The helical structure of protein is stabilized by .....
49. The purine bases present in RNA are adenine and .....
50. The pyrimidine bases present in DNA are cytosine and .....
51. The domain of chemistry beyond that of molecules and focuses on the chemical systems made up of a discrete number of assembled molecular subunits is called ----
52. Explain with examples supramolecules (2.5)
53. Define molecular self assembly. (2)
54.  $\text{KMnO}_4$  can be made soluble in benzene by the addition of [18]-crown-6 to it. Explain the chemistry
55. Explain how molecular recognition plays an important role in biological systems? (5)
56. Differentiate DNA and RNA (5)
57. Mention the different modes by which vander Waal's forces originate. (5)

**2017**

58. Explain the primary and secondary structures of protein. (2)
59. Explain how molecular recognition plays an important role in biological systems? (6)

**2018**

60. Discuss the different kinds of non covalent interactions significant in molecular self assembly. (6)

**2019**

61. Discuss briefly secondary structure of Proteins. (6)

**2020**

62. Name the different types of RNA. (1)
63. Discuss the structural features of DNA. (2)

**Combinatorial Chemistry**

64. What is combinatorial chemistry? Discuss briefly the applications of combinatorial synthesis in drug discovery. (6)

65. Combinatorial chemistry is not the sole answer to the pharmaceutical industry's challenge, but it is an invaluable tool for the drug discovery process. Discuss (6)

**2017**

66. Identify the basic principles of combinatorial synthesis. How combinatorial synthesis is useful in drug discovery process?

**2019**

67. Write S.N. on Combinatorial Synthesis. (6)

**2020**

68. Discuss briefly combinatorial synthesis. (6)

#### *Introduction to Computational Chemistry*

69. What is meant by a programming language? Give examples. (2)

70. Discuss linear and non-linear regression (2)

71. Discuss molecular mechanic method for molecular geometry optimization (6)

**2017**

72. Name an Operating system.

73. State whether true or false. The potential energy of all systems in molecular mechanics is calculated using force fields

74. What do you mean by geometry optimization in computational chemistry? (2)

75. Which are the basic molecular properties which can be computationally calculated? (5)

**2018**

76. A system software that manages computer hardware and software resources and provides common services for computer programs is called as ---

77. What do you mean by global minimum in computational chemistry? (2)

78. How ab initio methods differ from semi-empirical methods? (6)

**2019**

79. What is Curve fitting? (2)

80. What is Structured Programming? (2)

81. Discuss briefly Ab-initio method (2)

82. What is simple Linear regression? (2)

83. Write S.N. on Programming Languages (5)

**2020**

84. What is curve fitting? (1)

85. Discuss briefly semi-empirical method. (2)

86. What is an operating system? Give c examples (2)

87. What is simple linear regression? (2)

88. What is object-oriented programming? (2)

#### *Synthetic Polymers*

89. The branched chain polymer of polythene is called -----

90. A biodegradable polymer used for controlled drug release is -----

91. The monomer of polymer Teflon is .....

92. The monomer of polymer Neoprene is .....

93. The monomer of Lucite glass is -----

94. Monomer of natural rubber is .....

95. Give one application of Ziegler-Natta catalyst

96. Structure of monomer of PMMA is .....

97. Write the monomers of Buna N.

98. Name a biodegradable polymer used in surgical sutures

99. Mention the uses of kevlar, nomex and lexan.(2)

100. What is Ziegler Natta Catalyst (2)

101. Ziegler-Natta catalysts remain dominant in the production technology for polyolefins. Why? (2)
102. Mention any four applications of polyacetylene (2)
103. Write the monomer unit/s present in Kevlar. Mention its important applications. (2)
104. What are the applications of teflon and PMMA? (2)
105. Write a note on synthetic rubbers. (2)
106. What is Bakelite? Briefly discuss its important applications (5)
107. Why biodegradable polymers are preferred over non-biodegradable polymers. Describe the manufacture and application of any three biodegradable polymers. (6)
108. What is neoprene. Give its applications (5)
109. What are the monomers used for the synthesis of i) Kevlar, ii) Nylon 6 and iii) Bakelite? Give the structural formula and the main applications of these polymers? (5)

**2017**

110. Identify the monomers used for the synthesis of nylon 6.
111. Distinguish between Buna S and Buna N. (2)
112. What are the monomers used for the synthesis of Kevlar? Give the structural formula and its main applications? (2)
113. Briefly describe various biodegradable polymers available. (2)
114. Which among the following can be naturally produced?  
(i) PHBV. (ii) P.MMA. (iii) PVC (2)
115. Write note on:  
(i) Plastic identification codes. (ii) Biodegradable polymers (5)

**2018**

116. The abbreviation PMMA stands for . ---
117. What are the advantages of Ziegler Natta polymerization ? (2)
118. Why is it that PLA is a biodegradable thermoplastic aliphatic polyester? (2)
119. Write note on PAN (2.5)
120. Write short note on Nomex. (2.5)
121. Discuss the importance and advantages of biodegradable polymers (5)

**2019**

122. What is Tacticity ?
123. What is Zeigler-Natta Catalyst? Name a polymerization where it is used as a Catalyst (2)
124. Write S.N. on addition Polymers. Name any two addition Polymers. (6)
125. Discuss the applications of Buna S, Buna N and Neoprene (5)

**2020**

126. What is bakelite? (1)
127. Name any one Biodegradable polymer for delivery of macromolecules. (1)
128. What is terylene? What is its use? (2)
129. What are the advantages of Ziegler Natta polymerisation? (6)
130. Discuss the applications of Buna N, Buna S and Neoprene (5)

***Applied Inorganic Chemistry***

131. Malabar Cements Ltd. is situated in ----- district.
132. What is the substance used to slow down the setting of cement
133. The substance added for setting of cement is .....
134. Blue colour is imparted to glass by mixing with .....
135. Give the other name of hard glass
136. What is hard glass
137. What is safety glass
138. What is pyrex glass

139. The glass used in automobiles and airplanes is .....
- a) Safety glass b) ground glass c) Crooke's glass d) Crown glass
140. Flint glass is also known as .....
141. Give the formula for hard glass
142. The major constituent of talcum powder is -----
143. The refractive index of the glass can be increased by the addition of .....
144. What is the composition of talcum powder and tooth paste?
145. What is carborandum. What is its use?
146. What is annealing
147. What are rocket propellants? How are they classified?
148. Discuss the composition and health effect of toothpaste and talcum powder.
149. Write briefly about carbides and borides
150. Write notes on a) manufacturing of glasses b) Refractory materials
151. Explain the manufacture of cement. What is the chemistry behind the setting of cement?
152. Write in detail about the manufacturing of glass.
153. What are the raw materials used for the production of ammonium sulphate at F.A.C.T?
154. Explain the role of gypsum in the process of setting of cement and its mechanism of action (2)
155. Discuss the method of preparation of Caustic soda and chlorine at Travancore Cochin Chemicals Ltd. (5)

#### 2017

156. What does FACT stand for?
157. Name the major ingredient used as the abrasive in toothpaste.
158. Which are the main types of chemical rocket propellants? Give examples (6)
159. How is Portland cement manufactured? (6)
160. What are refractory materials? (6)

#### 2018

161. Name the major ingredient used as detergent in toothpaste.
162. Which is the main ore used in the sulphate method of  $\text{TiO}_2$  preparation?
163. Name one refractory boride.
164. What are the major uses of titanium dioxide? (2)
165. Explain the procedure adopted for manufacturing chlorine in TCC Ltd. (5)
166. Explain the chemistry behind the preparation of  $\text{TiO}_2$  through the sulphate process. (5)
167. Briefly explain about cryogenic liquid rocket propellants (5)

#### 2019

168. An example of Rocket propellant is---
169. What are Refractory Materials ?
170. Name the major component of Tooth Paste
171. How is Glass manufactured? (2)
172. Discuss briefly types of Glass (5)

#### 2020

173. Name the major component of talcum powder (1)
174. Write short note on refractory materials (6)
175. Write short note on manufacture and composition of Cement (5)

#### *Applied Organic Chemistry I*

176. Pre-ignition of the fuel in the cylinder ahead of the flame is called -----
177. The carbon range of kerosene oil is -----
178. Write the structure of Endosulfan.
179. The drugs which destroy micro organisms but are not safe in contact with human tissues are called -----

180. Soft soap generally contains
181. A fertilizer which contains more than one major nutrient is called .....
182. Name a hallucinogenic drug
183. ----- is a drug used in the treatment for systemic hypertension
184. A drug which can reduce the body temperature is called
185. Name an artificial sweetener which is unstable at cooking temperature
186. .... is commonly used as an antipyretic
  - a) Tetracycline b) salicylic acid c) Luminal d) Paracetamol
187. Explain potash fertilizers
188. What is octane number? How is it related to the efficiency of petrol?
189. Define the terms antihistamines and tranquilizers
190. Define cetane number
191. What are macronutrients? Give example.
192. What are detergents? Give example
193. Draw the structure of Aspirin
194. What are fungicides? Give examples
195. What is shampoo? How are they classified?
196. Briefly discuss the cleaning action of soap
197. Chemistry helps to increase the harvest of agriculture products, but its side effects make them not acceptable to public. Discuss
198. Pesticides are essential for increasing the crop production but their use should be controlled. Why
199. What are drugs? Write the important classification of drugs with examples
200. Write short notes on (a) antacids (b) antihistamines (c) antibiotics d) antipyretics
201. Explain the terms (a) pharmacognosy (b) pharmacodynamics (c) pharmacokinetics d) pharmacology.
202. Discuss the composition and health effects of soft drinks.
203. Write a short note on phosphate fertilizers
204. Give a brief account of soaps and detergents

### 2017

205. Name main chemical constituent of soap.
206. Ketoconazole or selenium sulphide present in shampoos act as ---
207. "Higher the Cetane number the more easily the fuel will combust in a compression setting such as a diesel engine". State whether it is true or false.
208. Give an example of an analgesic drug
209. What are the major component present in Potash fertilizer? (2)
210. What are the main disadvantages of detergents? (2)
211. What do you mean by knocking of fuels. Name any two antiknock agents used. (6)
212. How is paracetamol synthesized? (6)
213. Explain insecticides, herbicides, rodenticides and fungicides with suitable examples. (5)

### 2018

214. Name an antiknock agent used in petroleum industry.
215. What does CNG stand for?
216. Name anyone of the most common primary surfactants used in modern shampoos.
217. Explain briefly the difference between the generic and trade names of drugs with the help of one example (2)
218. How is cetane number calculated? (2)
219. Explain the various pharmacokinetic compartments, ADME, of a drug. (6)
220. Write notes on a) Rodenticides b) Octane number of the fuel (5)
221. How soap is functionally and chemically different from detergent? (5)
222. Write short note on Endosulfan. (2.5)

### 2019

223. Give an example of an Antacid.

224. An example of Antiknocking Compound is .....
225. Give the structure of BHC.
226. What are Analgesics? Give an example (2)
227. What are Insecticides? Give three examples. (2)
228. Write S. N. on Nitrogenous Fertilisers. (2)
229. What are the uses of LPG and CNG? (6)
230. How is Aspirin and Paracetamol synthesized? (6)
231. Discuss briefly the Carbon range and. used of various fractions of Petroleum distillation. (5)
232. What are the harmful effects of Pesticides? Briefly describe Endosulfan disaster in Kerala. (5)
233. Write S.N. on detergents-Explain the advantages and disadvantages. (5)

### 2020

234. Give an example of anesthetic. (1)
235. Give the structure of Endosulphan. (1)
236. What is cetane number? (1)
237. Name any one Inorganic Fertilizer. (1)
238. What are rodenticides? Give two examples. (2)
239. Discuss briefly the harmful effects of pesticides. (2)
240. Discuss briefly the uses of LPG and CNG (6)
241. What are anti psychedelic drugs? Give examples (6)
242. What are herbicides? Give-three examples and uses. (6)
243. Name two synthetic detergents? How do they differ from soap? What is the chemistry of cleansing action of soap? (6)
244. Give the preparation of Aspirin and Paracetamol (5)
245. Write short note on Knocking. What are anti knocking compounds (5)

### *Applied Organic Chemistry – II*

246. The group that gives the color of the dye is called .....
247. .... is the oldest known dye
248. .... is an example for anthraquinone dye
249. A group that increases/deepens the color of the dye is called .....
250. What are chromophores. Give example
251. ----- is an example of mordant dye.
252. Name a food preservative used in pickles and jams
253. The chemical compound used for the artificial ripening of fruits is -----
254. The shelf life of food materials is increased by the addition of .....
255. Write the composition of soda glass
256. Name a common adulterant used in chilly powder.
257. Name an antioxidant used in bakery food.
258. Monosodium glutamate is commonly called -----
259. Give the structure of crystal violet
260. Drug which produces sleep and reduces anxiety is .....
261. Which of the following is an anthraquinone dye  
Alizarin b) Methyl orange c) Phenolphthalein d) All the above
262. Draw the structures of antioxidants BHA and BHT
263. Write the important requirement for a dye
264. Draw the structure of Indigo dye.
265. What are antioxidants? Give examples.
266. Give the structure of Ajinomoto. For what purpose it is used?
267. What are artificial sweeteners? Give examples
268. What are dehydrated foods? Give examples.

269. Discuss the advantages of milk  
270. Discuss the harmful effects of modern food habits.  
271. Outline the chemical classification of dyes citing one example for each.  
272. Draw the structure of Malachite green  
273. Discuss the various methods used in food preservation  
274. What are the chemicals used in hair dye? Discuss their harmful effects.  
275. Discuss the theories of colour and chemical constitution (b) Outline the synthesis of Rosaniline and Indigo.

**2017**

276. Which cosmetic item has para-phenylenediamine as a major component?  
277. Discuss the theories of colour and chemical constitution (5)  
278. What are the common methods of preservation of food? (5)  
279. What are the common food adulterants in various food materials like milk, tea, and chilly powder. How the presence of the adulterants are identified. (10)

**2018**

280. Aspartame is an ---  
281. What is the basic functional use of pasteurization? (2)  
282. Name two commonly used food preservatives. (2)  
283. What do you mean by sunscreen protection factor (SPF)? (2)  
284. Write note on Health effects of soft drinks. (2.5)  
285. Explain the preparation and uses of Rosaniline and Indigo.

**2019**

286. List any two uses of Indigo. (2)  
287. Write S.N. on theories of chemical constitution of Dyes. (6)  
288. How is Rosaniline and Indigo prepared? (6)  
289. Discuss briefly the Common food Adulterants. How are they identified? (5)

**2020**

290. What is antiperspirant? (1)  
291. What are UV absorbers? (2)  
292. Discuss the preparation of Indigo. (2)  
293. Draw structures of BHT and BHA. (2)  
294. Write short note on chemical constitution of dye (6)  
295. Write short note on classification of dyes based on structure (6)  
296. Discuss the composition and advantages of Milk (5)