

Polymorphism Chemistry Questions with Solutions

Q1. Which of the following exhibit the largest London force?

- (a) Small molecules
- (b) Large molecules
- (c) Neutral molecules
- (d) None of the above

Answer: (b) Large molecules exhibit the largest London force.

Q2. Meta stable compounds exhibit

- (a) Long survival
- (b) Large wavelength
- (c) Both (a) and (b)
- (d) None of the above

Answer: (a) Meta stable compounds exhibit long survival.

Q3. Which of the following has a single isotope?

- (a) Gold
- (b) Calcium
- (c) Cadmium
- (d) None of the above

Answer: (a) Gold has a single isotope.

Q4. A compound exist in _____ form in polymorphism.

- (a) One
- (b) Two
- (c) More than one
- (d) None of the above

Answer: (c) A compound exists in more than one form in polymorphism.

Q5. Bone black is a polymorph of

- (a) Sulphur
- (b) Phosphorous
- (c) Carbon
- (d) None of the above

Answer: (b) Bone black is a polymorph of phosphorous.

Q6. What is polymorphism?

Answer: Polymorphism refers to the ability of the chemical composition to crystallise in two or more forms. It occurs due to temperature or pressure change.

Q7. What is the primary difference between polymorphism and allotropy?

Answer: The primary difference between polymorphism and allotropy is that polymorphism refers to the ability of the chemical composition to crystallise in two or more forms. In contrast, allotropy refers to the ability of the element to exist in two or more molecular structures.

Q8. What is polymorph? Give an example.

Answer: The different crystalline structures of a compound is referred to as polymorph. Zinc blende and wurtzite are the two polymorphs of zinc sulphide.

Q9. What is the primary difference between polymorphism and isomerism?

Answer: The primary difference between polymorphism and isomerism is that polymorphism refers to the ability of the chemical composition to crystallise in two or more forms. In contrast, isomerism refers to the ability of a compound to exist in two or more different atomic structures.

Q10. What do you understand by the term isomorphism?

Answer: Isomorphism refers to the existence of the same crystalline structures of two different compounds. The crystal shape of an isomorphous compound is identical to each other.

Q11. Do organic compounds show polymorphism?

Answer: Yes, organic compounds show polymorphism. It is the result of conformational polymorphism.

Q12. What are polymorphisms and their types?

Answer: Polymorphism refers to the ability of the chemical composition to crystallise in two or more forms. There are two types of polymorphism.

1. Monotropic Polymorphism
2. Enantiotropic Polymorphism

Q13. Name a technique which is used to identify polymorphism.

Answer: Gel electrophoresis is used to identify polymorphism.

Q14. What is the significance of polymorphism?

Answer: Polymorphism refers to the ability of the chemical composition to crystallise in two or more forms. It plays a crucial role in the pharma industry for drug development. The crystal structure helps in determining the drug's usefulness.

Q15. How will you differentiate between isomorphism and polymorphism?

Answer: We can differentiate between isomorphism and polymorphism in the following ways.

S. No.	Isomorphism	Polymorphism
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1.	Isomorphism refers to the resemblance in the crystalline structures of two different compounds.	Polymorphism refers to the existence of distinct crystalline forms of the same compound.
2.	Isomorphic compounds have identical crystal shapes.	Polymorphic compounds have different crystal structures.
3.	Isomorphism involves more than one compound at a time.	Polymorphism involves one compound at a time.
4.	It is not seen in elements.	It may be observed in elements.
5.	Isomorphous compounds have an identical atomic ratio.	Polymorphic compounds may or may not have identical atomic ratios.

Practise Questions on Polymorphism

Q1. What is the significance of polymorphism in pharma industries?

Answer: Bioavailability and Solubility are the two most important aspects of drug delivery. Polymorphism affects both of them. Drug polymorphism affects physicochemical properties like bioavailability, dissolution rate, solubility, and manufacturability. That's why detecting polymorphs in the drug manufacturing process and drug discovery is extremely important for quality control and assurance.

Q2. How does polymorphism affect the characteristics of drugs?

Answer: Due to the differences in the crystal structure, different polymorphs of a given solid drug show different physicochemical characteristics, which may lead to different drug bioavailability and half-life.

Q3. What do you understand by the term monotropic polymorphism?

Answer: In the monotropic polymorphism, only one polymorph is stable for all acceptable temperatures. The compound metolazone exhibits this type of polymorphism.

Q4. What do you understand by the term Enantiotropic Polymorphism?

Answer: In the enantiotropic system of polymorphism, there are different polymorphs, and each polymorph is stable under a specific temperature range. Thus, one polymorph can be stable at a low-temperature range. One can be stable at a high-temperature range, and so on. The compounds acetazolamide and carbamazepine exhibit this type of polymorphism.

Q5. What is the effect of polymorphism on a compound?

Answer: A compound's different types of polymorphs possess distinct physical and sometimes chemical properties, although the solutions and vapours appear identical. Different polymorphs of a substance may exhibit substantial differences in physical properties such as melting point, colour, hardness, density, electrical conductivity, hygroscopicity, latent heat of fusion, solubility, dissolution rate, and variance in chemical reactivity.

