

**TDC Part III  
Paper VI  
Inorganic Chemistry**



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**TOPIC:- SUMMARY, IMPORTANT QUESTIONS**

## SUMMARY

The HSAB (Hard Soft Acid Base) theory categorizes chemical species as acids or bases and as “hard”, “soft”, or “borderline”. It explains that soft acids or bases tend to be large and very polarizable, while hard acids or bases are small and non-polarizable. Since these categories are not absolute, there are species that are considered borderline, which lie in between hard and soft.

**Hard acid** – high positive charge, small size, not easily polarized

**Soft acid** – low positive charge, large size, easily oxidized, high polarizability  
Hard base – low polarizability, high electronegativity, not easily oxidized

**Soft base** – high polarizability, diffuse donor orbital, low electronegativity, easily oxidized  
HSAB provides a semi-quantitative method for understanding trends in acid-base

**Reactivity:** hard acids like hard bases and soft acids like soft bases.

## IMPORTANT QUESTIONS

1. Define soft base and give one example.
2. What is symbiosis?
3. How does HSAB principle govern the occurrence of minerals?
4. Define absolute hardness.
5. Give two examples of border line acids.
6. Which of the following is odd among the following:

$\text{Li}^+$ ,  $\text{Ga}^{3+}$ ,  $\text{Cd}^{2+}$ ,  $\text{K}^+$

1. Why is pyridine a border line base while ammonia is a hard base?
2. What are the limitations of HSAB principle?
3. What are hard and soft acids and bases? Explain the HSAB principle with suitable examples.
4. Discuss the effect of substituent on hardness and softness of an acid.
5. How does HSAB principle explain the validity of the following reactions?
6. Discuss the contribution of  $\pi$ -bonding in soft-soft interactions.
7. Discuss giving examples, the applications of HSAB principle.
8. What are the theoretical justifications of HSAB principle?
9. Describe the origin of concept of hard and soft acids and bases.
10. Predict which way the following reactions will proceed:
11. Explain the following.
12. What are the characteristics of a soft acid and a soft base?
13. Explain HSAB principle. Discuss its applications.
14. Explain clearly why hard acids co-ordinate with hard bases and soft acids co-ordinate with soft bases.
15. Hard-hard interaction is the major driving force for a reaction to proceed. Discuss
16. Explain the various limitations of HSAB principle.
17. What are hard acids and hard bases? Give their important characteristics.
18. What is HSAB principle? What are its uses?
19. How will you determine the relative strength of hard and soft acids and bases?
20. Why are hard-hard and soft-soft combinations preferred to hard-soft or soft-hard combination?
21. How does HSAB principle govern the occurrence of minerals?
22. What are hard acids and bases? Give their important characteristics.
23. How electronegativity can be used to explain hardness and softness of acids and bases?

24. Define HSAB principle. Discuss the applications of hard soft acid base principle.
25. State and explain HSAB principle.
26. Describe the contribution of  $\pi$ -bonding in soft-soft interactions.
27. What is symbiosis? Discuss theoretical basis of hardness and softness.