

exam_id	question	option_1	option_2	option_3
	1. Which of the following is a paramagnetic carbonyl?	Cr(CO) <sub>6</sub>	Fe(CO) <sub>6</sub>	V(CO) <sub>6</sub>
	2. Which of the following contains M – M single bond?	Ni(CO) <sub>4</sub>	Fe(CO) <sub>6</sub>	Mn <sub>2</sub> (CO) <sub>10</sub>
	3. According to Wade's rules, B <sub>5</sub> H <sub>9</sub> is:	Closo	Nido	Arachno
	4. According to Wade's rules, B <sub>4</sub> H <sub>10</sub> is:	Closo	Nido	Arachno
	5. [B <sub>12</sub> H <sub>12</sub> ] <sup>2-</sup> has the geometry:	Icosahedral	Octahedral	Tetrahedral
	6. Carbonyl with only terminal CO ligands:	Co <sub>2</sub> (CO) <sub>8</sub>	Fe(CO) <sub>5</sub>	[Fe <sub>2</sub> (CO) <sub>9</sub> ]
	7. Spectroscopy for pi backbonding detection:	IR Spectroscopy	Mass Spectrometry	UV Spectroscopy
	8. Electrophilic substitution on ferrocene occurs:	On Fe center	On Cp ring	On both Cp rings simultaneously
	9. Eclipsed ferrocene point group:	D <sub>5h</sub>	D <sub>5d</sub>	C <sub>5v</sub>
	10. Which one undergoes electrophilic substitution more easily than benzene?	Ferrocene	Zeise's salt	Ni(CO) <sub>4</sub>

11. Coordination of ethylene in Zeise's salt results in:

Shortening of C=C bond      Lengthening of C=C bond      Conversion to C≡C

12. How many skeletal electron pairs are present in  $[B_5H_9]$  ?

4

6

7

13. Which fragment is isolobal with CH?



14. Which feature confirms  $\pi$ -backbonding in Zeise's salt?

Shortened Pt–Cl bond      Elongated C=C bond      Blue color of the bond of ethylene salt

15. The isolobal relationship helps in:

Predicting stereochemistry      Mapping between organic and inorganic fragments      Calculating redox potentials

16. The difference in  $\nu(CO)$  frequencies between bridging and terminal CO is generally:

Bridging > terminal

Bridging < terminal

Same

17. The formal oxidation state of Fe in ferrocene,  $Fe(\eta^5-C_5H_5)_2$ , is:

0

2+

3+

18. The hapticity of each cyclopentadienyl ligand in ferrocene is:

$\eta^1$

$\eta^3$

$\eta^5$

19. According to Wade's rules,  $B_5H_9$  is:

Ccloso

Nido

Arachno

20. According to Wade's rules,  $B_4H_{10}$  is:

Ccloso

Nido

Arachno

21.  $[B_{12}H_{12}]^{2-}$  has the geometry:

Icosahedral

Octahedral

Tetrahedral

22. How many skeletal electron pairs are present in  $[B_5H_9]$  ?

4

6

7

23. Which fragment is isolobal with CH?

$BH_2$

$Fe(CO)_4$

$Mn(CO)_5$

24. The isolobal relationship helps in: Predicting stereochemistry between organic and inorganic fragments Mapping between organic and inorganic fragments Calculating redox potentials

25. According to Wade's rules,  $[B_6H_6]^{2-}$  is:

Nido

Arachno

Ccloso

26.  $CH_3$  is isolobal with:

$Fe(CO)_4$

$Mn(CO)_5$

$Co(CO)_5$

27. Which borane is classified as nido by Wade's rules?

$B_{10}H_{14}$

$B_4H_{10}$

$[B_{12}H_{12}]^{2-}$

28. According to Wade's rules, the skeletal electron pair count (SEP) for  $[B_5H_5]^{2-}$  is:

4

5

6

29. The isolobal analogy helps in rationalizing the electronic structure of:	Organic molecules only	Organometallic fragments only	Both organic and organometallic fragments
30. The number of skeletal electrons present in the compounds $C_2B_3H_5$ , $C_2B_4H_6$ , and $B_4H_9$ are respectively	10, 12, 12	12, 14, 14	10, 12, 14
32. Classify the structure of the given complex $[PCB_9H_{11}]^-$	closo	nido	arachno
33. Classify the structure of the complex: $C_2B_3H_7$	closo	arachno	nido
34. Classify the strcture of the given complex: $As_2C_2B_7H_9$	closo	nido	arachno
35. The replacement of Cl atom from P-Cl part of phosphazene takes place by mechanism	$S_N^1$	$S_E^1$	$S_N^2$
36. Phospham is	$P_3N_3Cl_6$	$P_3N_6(NH)_3$	$P_3N_3(NH_2)_3$

37. The reaction of  $\text{BCl}_3$  with  $\text{NH}_4\text{Cl}$  gives product A which upon reduction by  $\text{NaBH}_4$  gives product  $\text{Cl}_3\text{B}_3\text{N}_3\text{H}_9$  product B. product B upon reacting with  $\text{HCl}$  affords compound C, which is
38. How many B-B- B 3 centre -2 electron bonds are present in  $\text{B}_4\text{H}_{10}$ ?
39. The structure of diborane ( $\text{B}_2\text{H}_6$ ) contains:
- |                                      |                                     |                                     |
|--------------------------------------|-------------------------------------|-------------------------------------|
| two 2 centre - 2 electron bonds      | four 2 centre - 2 electron bonds    | two 2 centre - 2 electron bonds     |
| and four 3 centre - 2 electron bonds | and two 3 centre - 2 electron bonds | and two 3 centre - 2 electron bonds |
40. Which is inorganic benzene?
- |       |       |          |
|-------|-------|----------|
| Boron | Borax | Boroline |
|-------|-------|----------|

option\_4

image

correct option



**Answer:** C.



**Answer:** C.

Hypho

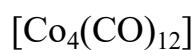
**Answer:** B.

Hypho

**Answer:** C.

Cubic

**Answer:** A.



**Answer:** B.

NQR  
Spectroscopy

**Answer:** A

On solvent

**Answer:** B.

$\text{C}_{2v}$

**Answer:** A.



**Answer:** A.

No change

**Answer:** B.

8

**Answer:** C.

$\text{Co}(\text{CO})_3$

**Answer:** D.

Square-pyramidal  
geometry

**Answer:** B.

Measuring bond  
lengths

**Answer:** B.

Depends on metal  
only

**Answer:** B.

-2

**Answer:** B.

$\eta^6$

**Answer:** C.

Hypho                   **Answer:** B.

Hypho                   **Answer:** C.

Cubic                   **Answer:** A.

8                         **Answer:** C.

Co(CO)<sub>3</sub>           **Answer:** D.

Measuring bond  
lengths               **Answer:** B.

Hypho                   **Answer:** C.

BH                       **Answer:** B.

B<sub>6</sub>H<sub>6</sub>                   **Answer:** A.

7                         **Answer:** C.

Inorganic salts  
only

**Answer: C.**

12,14,12

**Answer: D**

klado

**Answer: B**

klado

Hypercloso

$S_E^2$

Answer: C

$P_3N_3(NH_2)_6$

Answer: C

[ClH)3 B3N3(ClH)3

Answer: A

2

Answer: B

four 2 centre - 2  
electron bonds  
and four 3 centre -  
2 electron bonds

Answer: B

Borazole

Answer: D