$_{24}Cr = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ \cancel{4s^2\ 3d^4}$

$= 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$

$_{29}Cu = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^9$

$= 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^{10}$

Note ⇒ Half filled and fully filled Conf is more stable

Note ⇒ excitation energy < exchange energy

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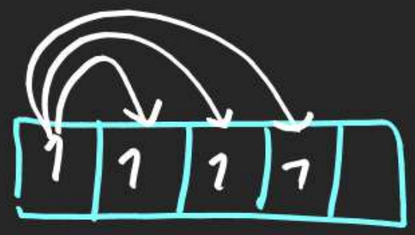
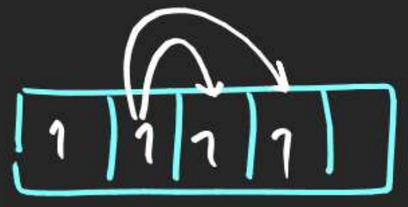
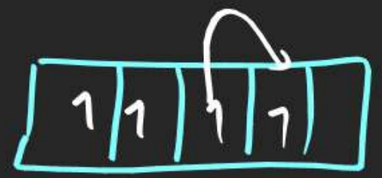
$C_2 = 3d^4$



3



2



1

total exchange = 6

4

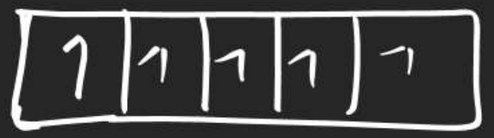
3

2

1

10

$$\text{number of exchange} = \frac{n(n-1)}{2}$$



n = number of e^- having same spin

$$= \frac{5(5-1)}{2}$$

$$= 10$$

d^{10} | ↑↓ | ↑↓ | ↑↓ | ↑↓ | ↑↓ |

↑	↓
$= \frac{n(n-1)}{2}$	$\frac{n(n-1)}{2}$
$= \frac{5(5-1)}{2}$	$\frac{5(5-1)}{2}$
$= 10$	$= 10$

Note ⇒ fully filled Conf. is more stable than Half filled

total number of exchange $= 10 + 10 = 20$

4s 3d

3

$C = 1s^2 2s^2 2p^2$

$C = 1s^2 2s^1 2p^3$

$F = 1s^2 2s^2 2p^5$

$= 1s^2 2s^1 2p^6$

excitation energy > exchange energy

$$_{64}Gd = \underline{1s^2}\ \underline{2s^2\ 2p^6}\ 3s^2\ 3p^6\ \underline{4s^2\ 3d^{10}\ 4p^6}\ \underline{5s^2\ 4d^{10}\ 5p^6}\ 6s^2\ 4f^7\ \underline{5d^1}\ 6p$$

excitation energy = req. energy for excitation of an e^-

exchange energy = relese energy from exchange of e^-

Concept of stability $\Rightarrow$ relese energy $>$ req. energy

$_{57}La = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^1$

$6s^2 5d^1$

last e^- not entered in 4f.

last e^- in $_{57}La$ entered in sd

$_{89}Ac$: last e^- donot entered in 5f

last e^- in $_{89}Ac$ entered in 6d'

$_{46}Pd = 4d^{10}$

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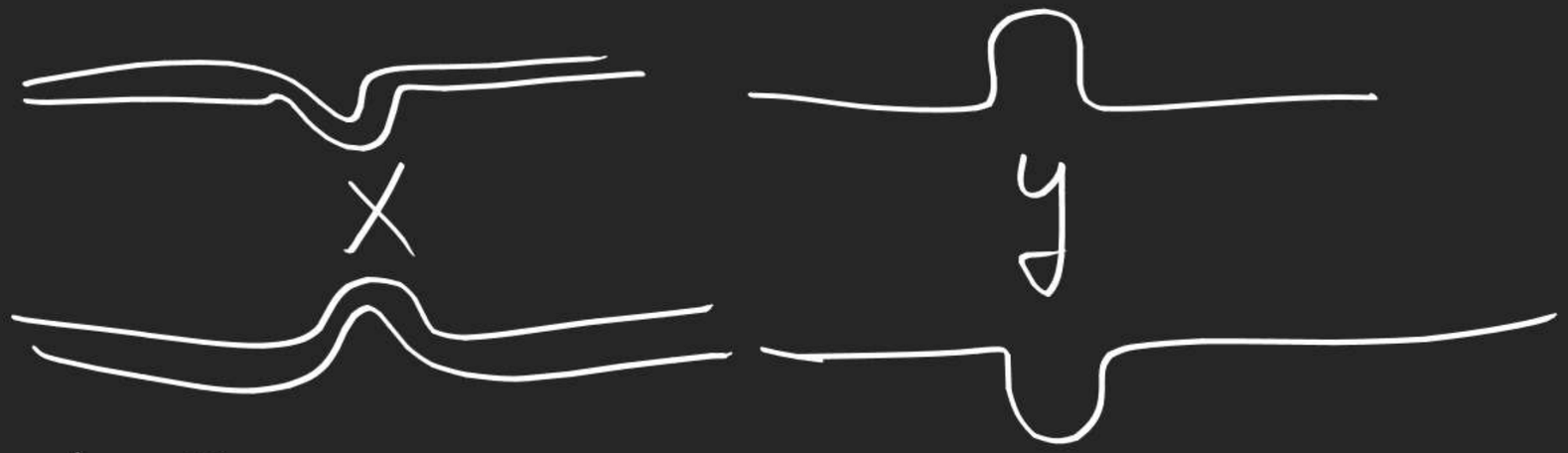
Paramagnetic and diamagnetic Compound.



X = Paramag

y = Diamag

→ When species Have unpaired electron (U·P·e)
then it is paramag.

→ When species donot Have unpaired e⁻
then it is diamag.

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one Which of the following atom is paramag

s ↑

p ↑↓ ↑ ↑

d ↑↓ ↑↓ ↑↓ ↑ ↑

$_{30}Zn = 3d^{10}4s^2$

(1) $_{24}Cr$ (2) $_{30}Zn$ (3) $_{10}Ne$ (4) all

$Ne = 2s^2 2p^6$

$Cr = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$

Conf. of Ions

$_{11}Na = 1s^2 2s^2 2p^6 3s^1$

$_{11}Na^+ = 1s^2 2s^2 2p^6$

$_{17}Cl = 1s^2 2s^2 2p^6 3s^2 3p^5$

$Cl^{\ominus} = 1s^2 2s^2 2p^6 3s^2 3p^6$

Fe^{+2}

26

$Fe = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

$Fe = 1s^2 2s^2 2p^6 3s^2 \underline{3p^6 3d^6} \underline{4s^2}$

26

$Fe^{+2} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 \underline{4s^0}$

26

one

Which of the following Cation is paramagnetic

① $_{21}Sc^{+3}$ ② $_{28}Ni^{+2}$ ③ $_{29}Cu^{+}$ ④ all are Paramag

$_{21}Sc = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$

$_{21}Sc^{+3} = 1s^2 2s^2 2p^6 3s^2 3p^6$

$_{28}Ni = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$

$_{28}Ni^{+2} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$

$Cu^{+} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$

$Cu = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$

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Spin only magnetic moment (μ) = $\sqrt{n(n+2)}$ B.M

n = number of unpair e⁻

Unpaired e⁻	μ
1	1.73
2	2.80
3	3.80
4	4.90
5	5.90

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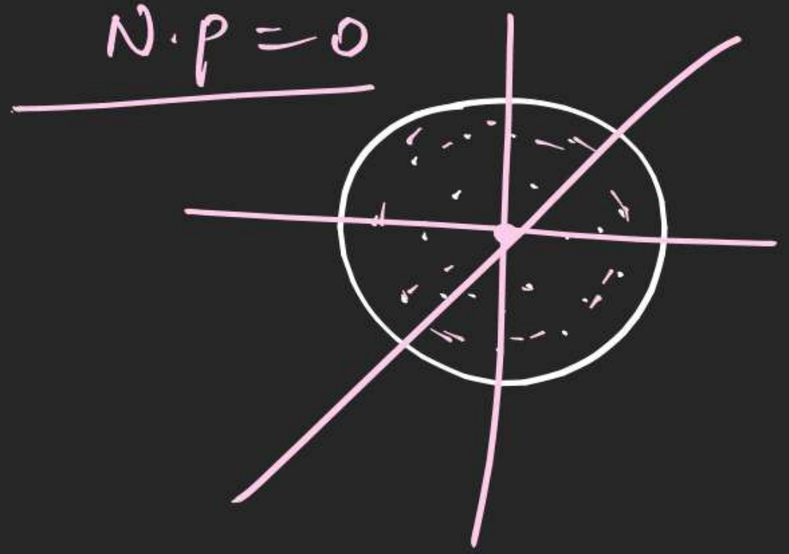
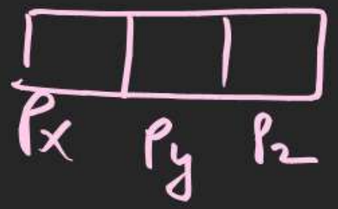
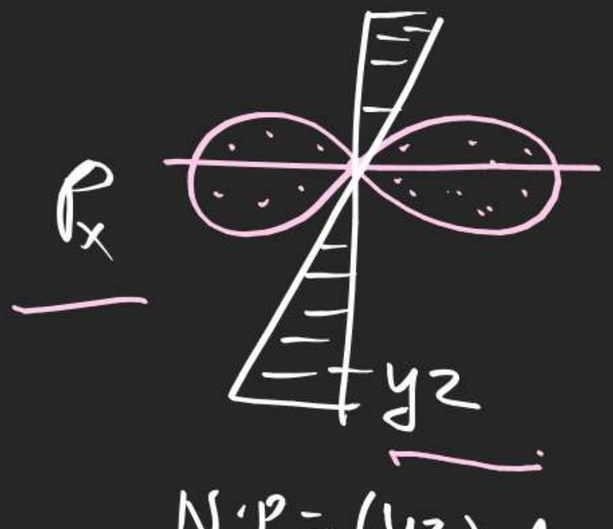
- **Nodal plane** ⇒ any imaginary plane which has zero e^- probability and must be passed through nucleus of atomic orbital

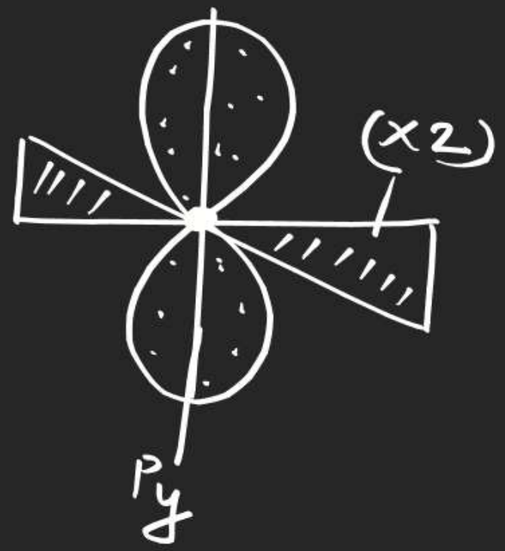
N.p = 0



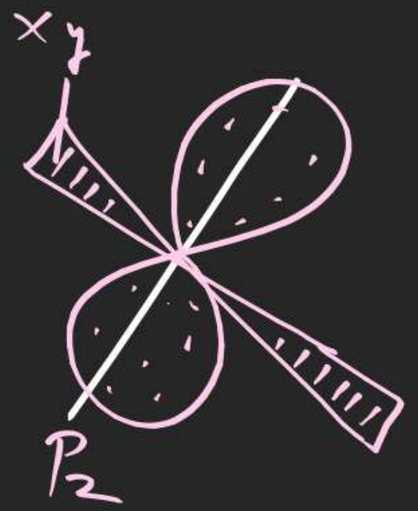




N·P = (yz) 1



N·P = 1 (xz)



N·P = 1 (xy)

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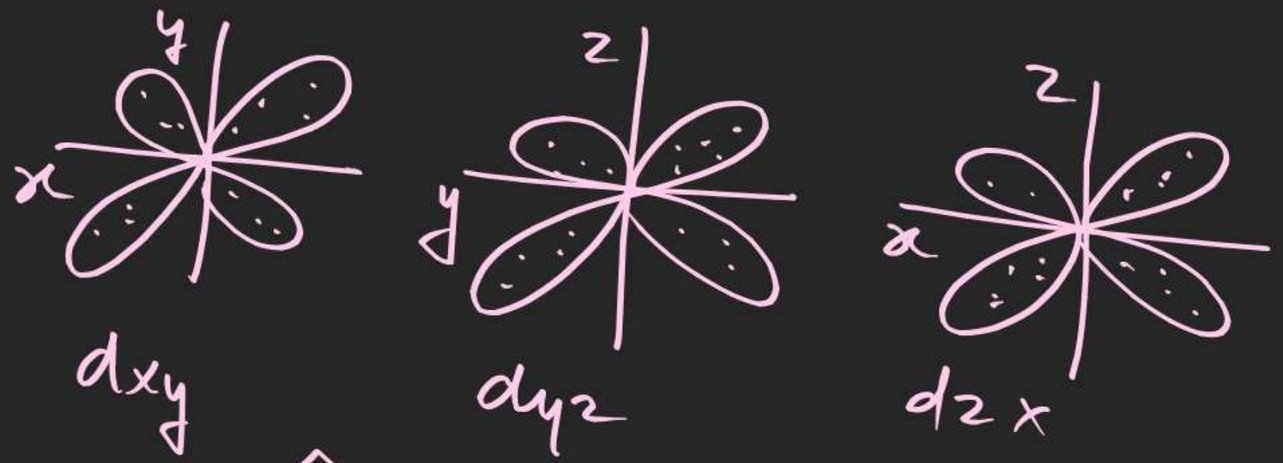
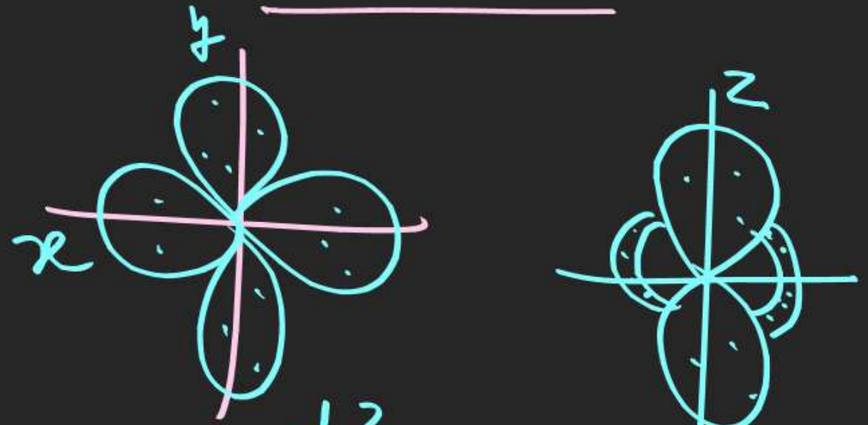


d_{xy} d_{yz} d_{zx}

nonaxial



$d_{x^2-y^2}$ d_{z^2}

axial

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Electronic Conf.

24 Cr

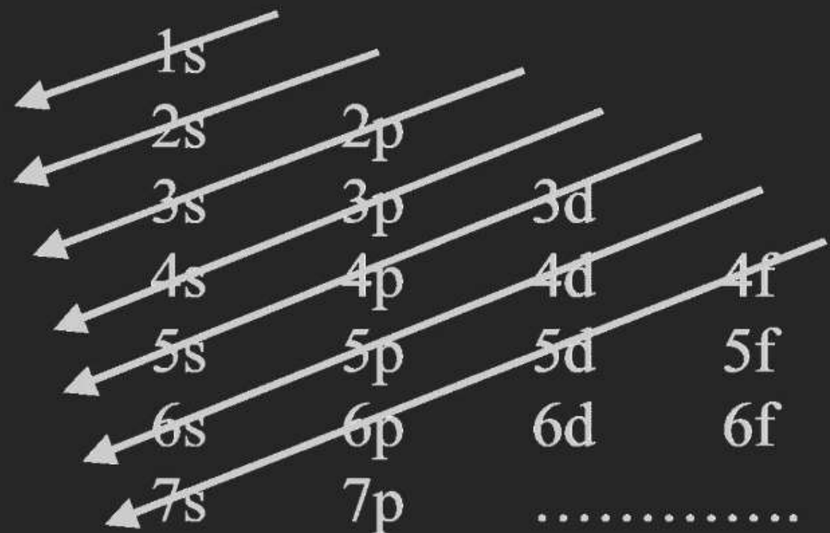
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^4$ | $4p\ 5s\ 3d\ 5p\ 6s\ 4f\ 5d\ 6p\ 7s\ 5f\ 6d\ 7p$

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$ |

GENERAL CHEMISTRY

2. Aufbau Principle (Means Building up) :

(i) The electrons are added progressively to the various orbitals in the order of increasing energies starting with the orbital of the lowest energy



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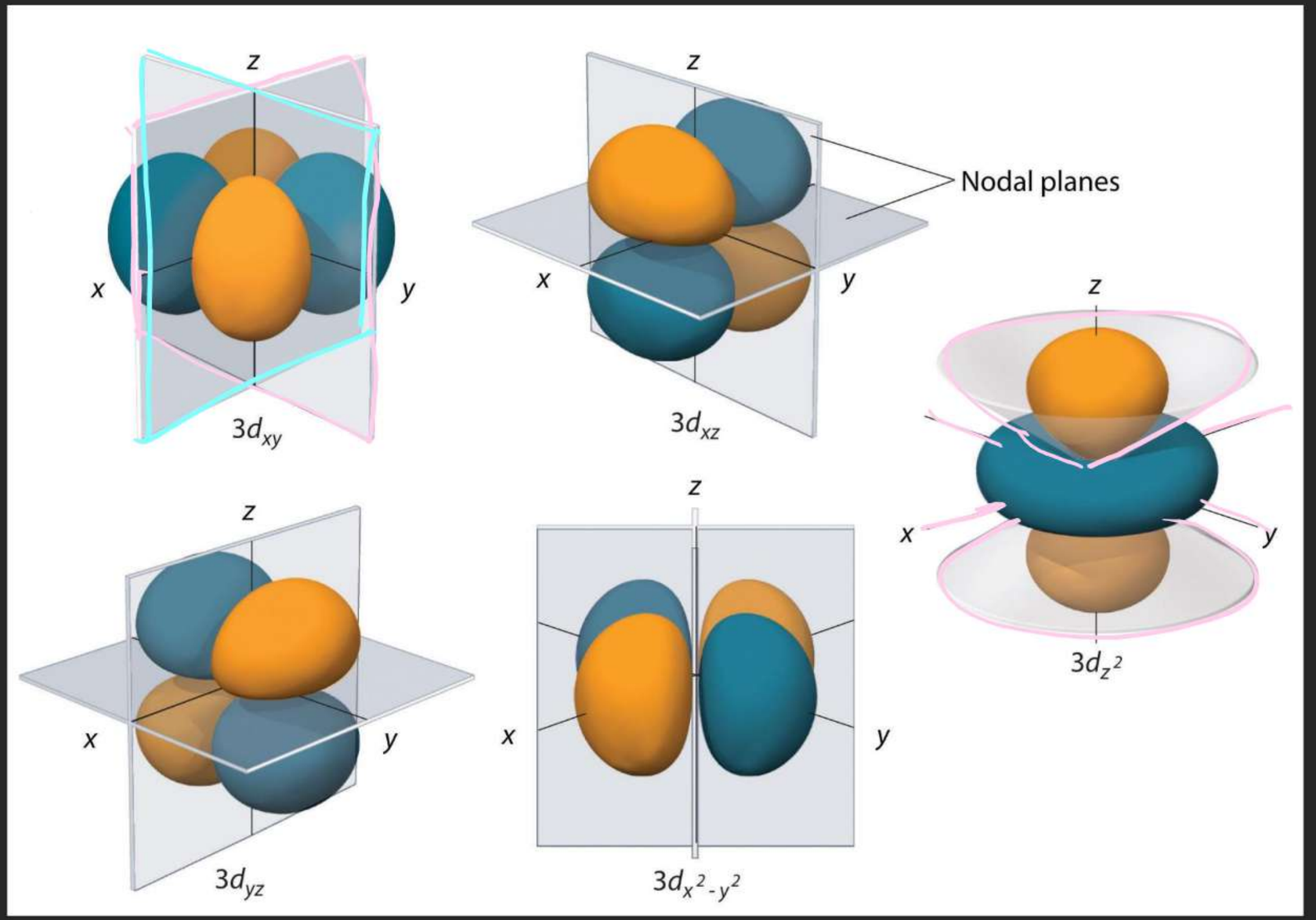
GENERAL CHEMISTRY



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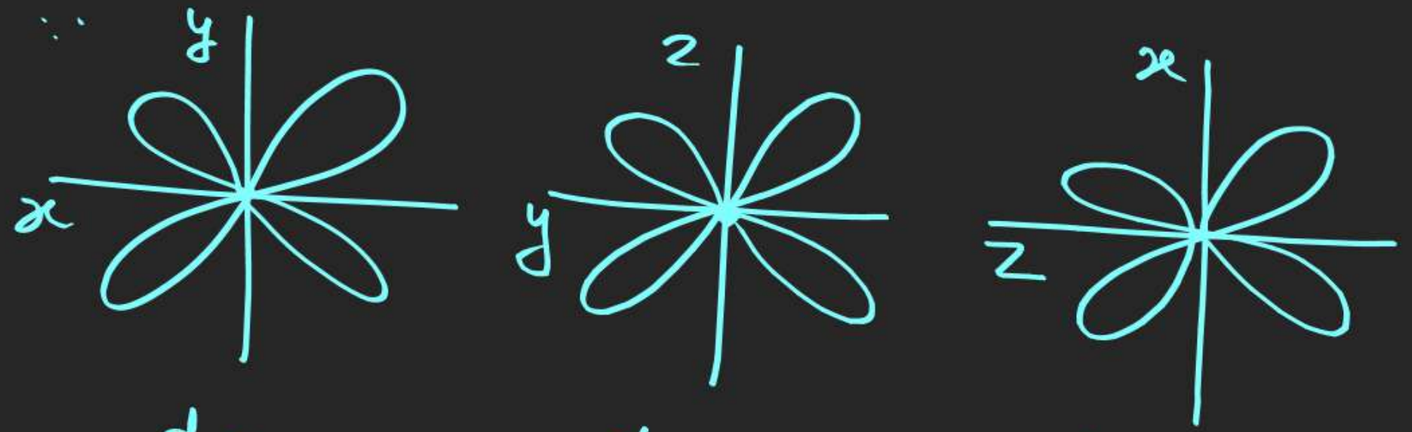

d_{xy} d_{yz} d_{xz}

non axial

N·P = 2 (yz), (xz)

(xy) (xz) (yz) (xy)

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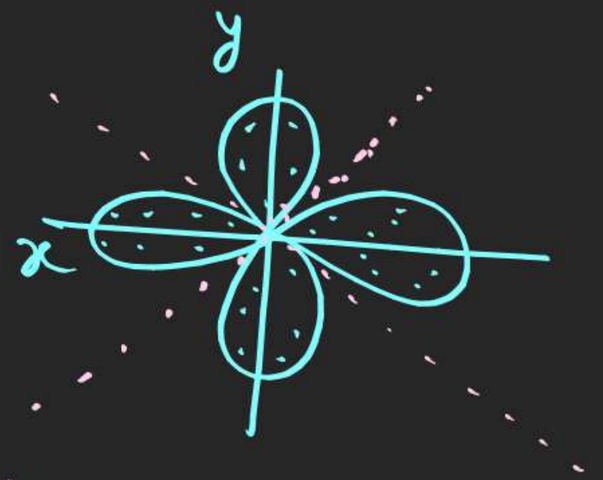
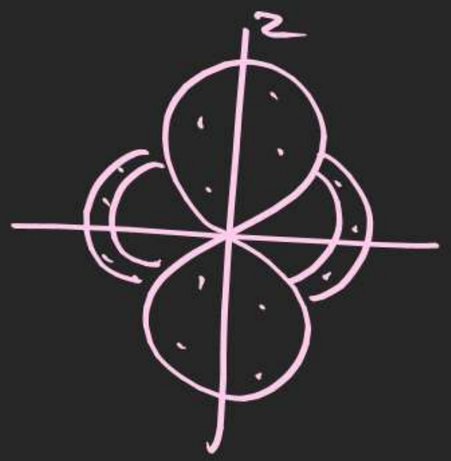


N.P = 2



N.P = 0

Nodal cone present

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GENERAL CHEMISTRY

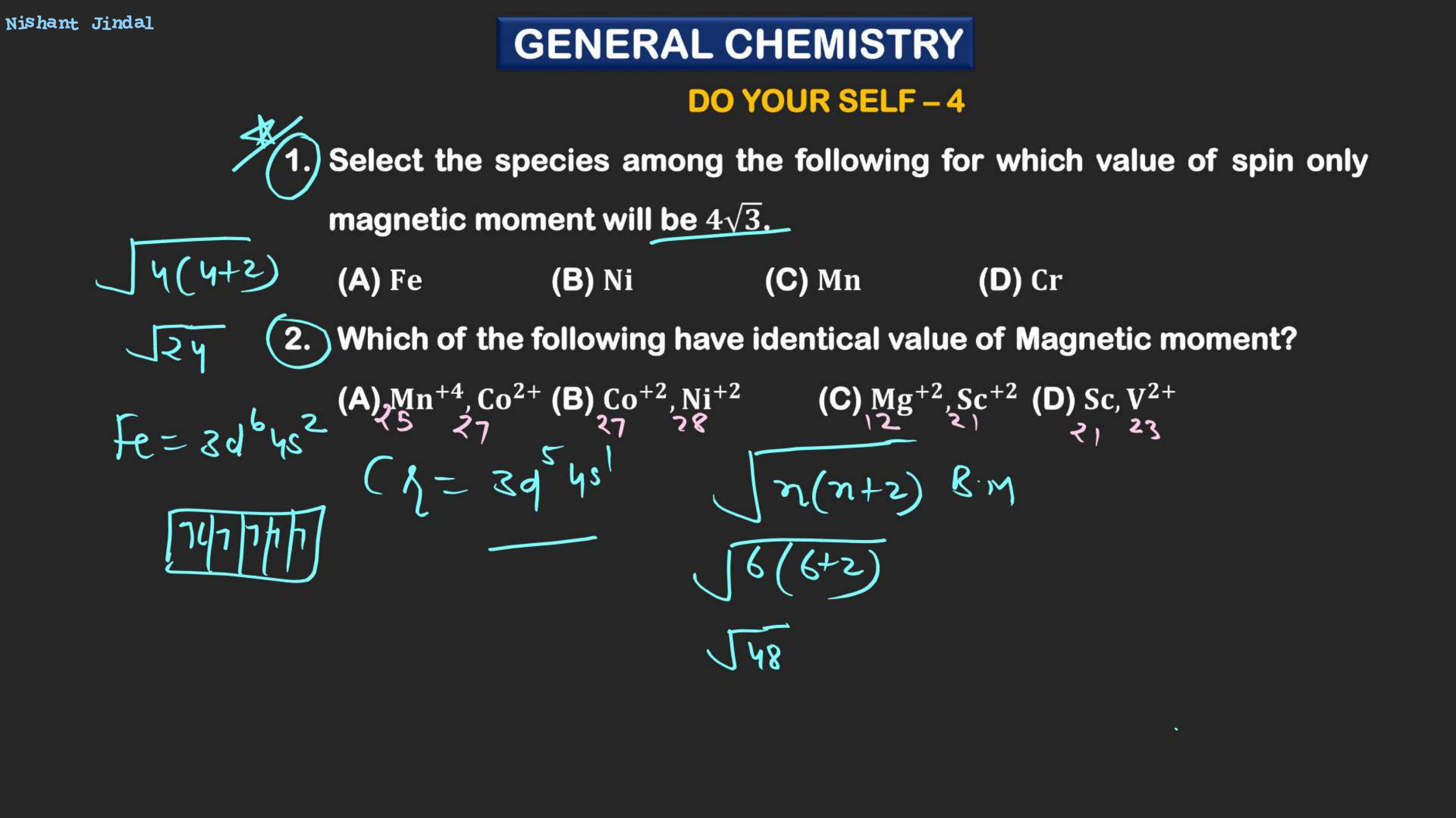
DO YOUR SELF – 4

1. Select the species among the following for which value of spin only magnetic moment will be $4\sqrt{3}$.

(A) Fe (B) Ni (C) Mn (D) Cr

2. Which of the following have identical value of Magnetic moment?

(A) Mn^{+4}, Co^{2+} (B) Co^{+2}, Ni^{+2} (C) Mg^{+2}, Sc^{+2} (D) Sc, V^{2+}



H.W

DPP → 1, 2, 3, 4

Sheet → all Questions (ex. 1 except ⇒ Zeff

S.E