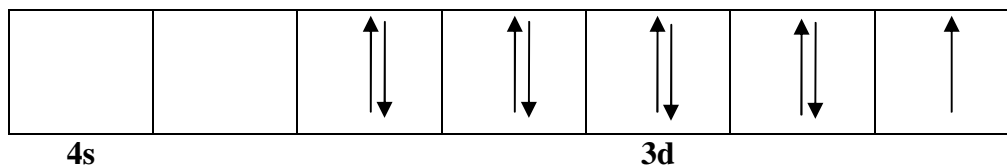


2

- Compounds of *d*-block elements are frequently paramagnetic. Using the box notation to represent atomic orbitals, account for this property in compounds of Cu^{2+} .

As Cu is in group 11, it has 11 valence electrons. Cu^{2+} therefore has $(11 - 2) = 9$. These occupy the five 3d orbitals:



There is an unpaired electron and so Cu^{2+} is paramagnetic.

6

- Complete the following table.

Formula	Oxidation state of transition metal	Coordination number of transition metal	Number of <i>d</i> -electrons in the transition metal	Species formed upon dissolving in water
$\text{Na}_2[\text{CoCl}_4]$	+2	4	7	Na^+ , $[\text{CoCl}_4]^{2-}$
$[\text{Ni}(\text{NH}_3)_5(\text{H}_2\text{O})]\text{SO}_4$	+2	6	8	$[\text{Ni}(\text{NH}_3)_5(\text{H}_2\text{O})]^{2+}$, SO_4^{2-}
$[\text{Cr}(\text{en})_3]\text{Br}_3$	+3	6	3	$[\text{Cr}(\text{en})_3]^{3+}$, Br^-

en = ethylenediamine = $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$