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- Iron, copper and zinc all play important natural roles in our biology. Select one of these elements and explain what features of its chemistry are important in allowing the element to carry out its roles.

Iron is stable in two oxidation states, Fe^{2+} and Fe^{3+}, of similar stability. Both can can form octahedral complexes. In haemoglobin, the Fe^{2+} forms five bonds to the haem unit and the protein. The sixth site is available to bind molecular oxygen and this is accompanied by a change in the oxidation state to Fe^{3+}. The O_2 is carried to body tissues where it is released and the iron is returned to Fe^{2+}.

Copper is stable in two oxidation state, Cu^{+} and Cu^{2+}, of similar stability. Copper is involved in electron transfer proteins where is uses its ability to change oxidation state to provide or remove electrons as required.

Zinc forms only one oxidation state, Zn^{2+}. This cation is smaller and is a good Lewis acid. Water bonded to it loses a proton to form OH^{-} which is used in carbonic anhydrase to capture carbon dioxide for transport.

Platinum complexes and lithium salts are active pharmaceutical agents. Select one and explain what features of its metal's chemistry are important in allowing it to be an effective pharmaceutical.

***cis*-Platin: $[Pt(NH_3)_2Cl_2]$ can bind to DNA by losing the chloride ions in the square planar complex. The corresponding *trans* compound is inactive. Lability of the Cl's and the shape of square planar complex are both crucial to the effectiveness of this platinum compound.**

Lithium salts are used to treat manic depression and other psychological disorders. Li^{+} has the same charge as Na^{+} and a similar size to Mg^{2+} and it is possible that its effects are due to interaction with these cations in neurons.