

CHEM1611 Answers to Problem Sheet 3

1. .

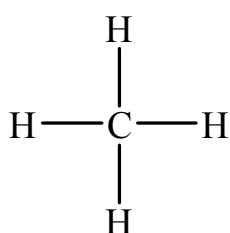
	Metal	Property which is important for biological activity	Biological function to which this property is relevant
(a)	Cu	Can exist in two oxidation states, +I and +II	Electron transfer (redox) reactions
(b)	Zn	Ion has only one stable oxidation state so not redox active	Structural role in determining protein shape
(c)	Fe	Can exist in two stable oxidation states (Fe^{2+} and Fe^{3+}), can bind oxygen and carbon dioxide	Oxygen transport in blood
(d)	Pt	Forms 'complexes' that can bind DNA	Cancer chemotherapy
(e)	Na	Small positive ion with low polarisability	Maintains ion circuits / pumps

2. **Electronegativity differences > 2 generally result in ionic bonding. A compound of rubidium and oxygen would be expected to be ionic, formula Rb_2O and likely to be a solid at room temperature, conduct electricity when molten or dissolved in water and be brittle. A compound between silicon and oxygen would be predicted to be covalent, formula SiO_2 . From our everyday experience silica (SiO_2 , sand) is a high melting solid. It is not predicted to conduct electricity when molten and does not dissolve in water.**

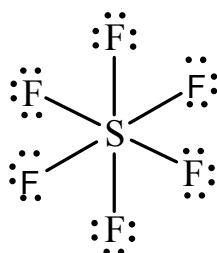
3. **A small displacement of one part of the crystal lattice relative to another in an ionic solid will change the electrostatic forces between neighbouring ions from attractive to repulsive forces and the material shatters. In a metal, cations are embedded in a 'sea' of electrons which can easily flow around the ions. Displacement of some ions relative to others is accompanied by a movement of electrons maintaining the attractive forces between cations and electrons and hence the integrity of the material.**

4.

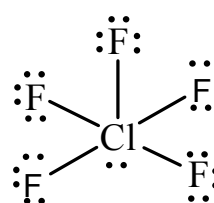
(a) CH_4



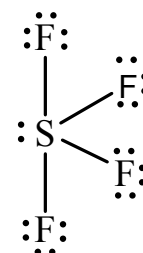
(b) SF_6



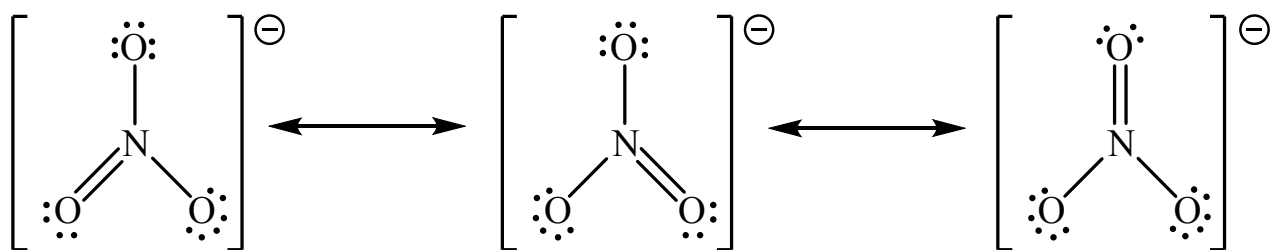
(c) ClF_5



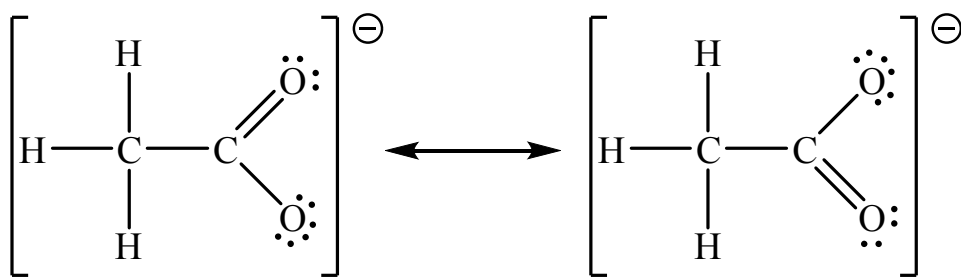
(d) SF_4



(e) NO_3^-



(f) CH_3CO_2^-



(g)

