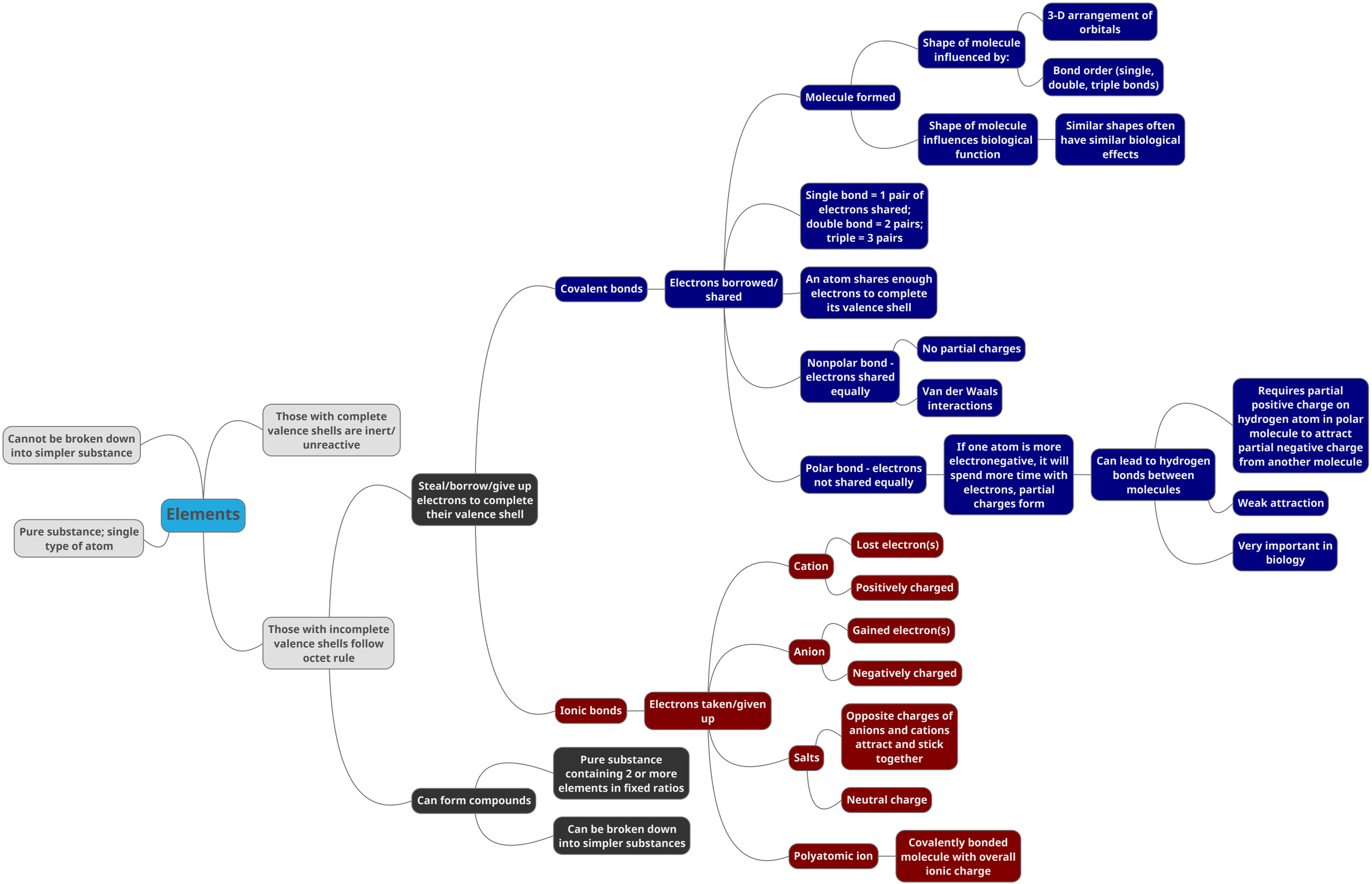
Elements
Cannot be broken down into simpler substance
Pure substance; single type of atom
Those with complete valence shells are inert/ unreactive
Those with incomplete valence shells follow octet rule
Steal/borrow/give up electrons to complete their valence shell
Can form compounds
Pure substance containing 2 or more elements in fixed ratios
Can be broken down into simpler substances
Covalent bonds
Electrons borrowed/ shared
Molecule formed
Shape of molecule influenced by:
3-D arrangement of orbitals
Bond order (single, double, triple bonds)
Shape of molecule influences biological function
Similar shapes often have similar biological effects
Single bond = 1 pair of electrons shared; double bond = 2 pairs; triple = 3 pairs
An atom shares enough electrons to complete its valence shell
Nonpolar bond - electrons shared equally
No partial charges
Van der Waals interactions
Polar bond - electrons not shared equally
If one atom is more electronegative, it will spend more time with electrons, partial charges form
Can lead to hydrogen bonds between molecules
Requires partial positive charge on hydrogen atom in polar molecule to attract partial negative charge from another molecule
Weak attraction
Very important in biology
Ionic bonds
Electrons taken/given up
Cation
Lost electron(s)
Positively charged
Anion
Gained electron(s)
Negatively charged
Salts
Opposite charges of anions and cations attract and stick together
Neutral charge
Polyatomic ion
Covalently bonded molecule with overall ionic charge