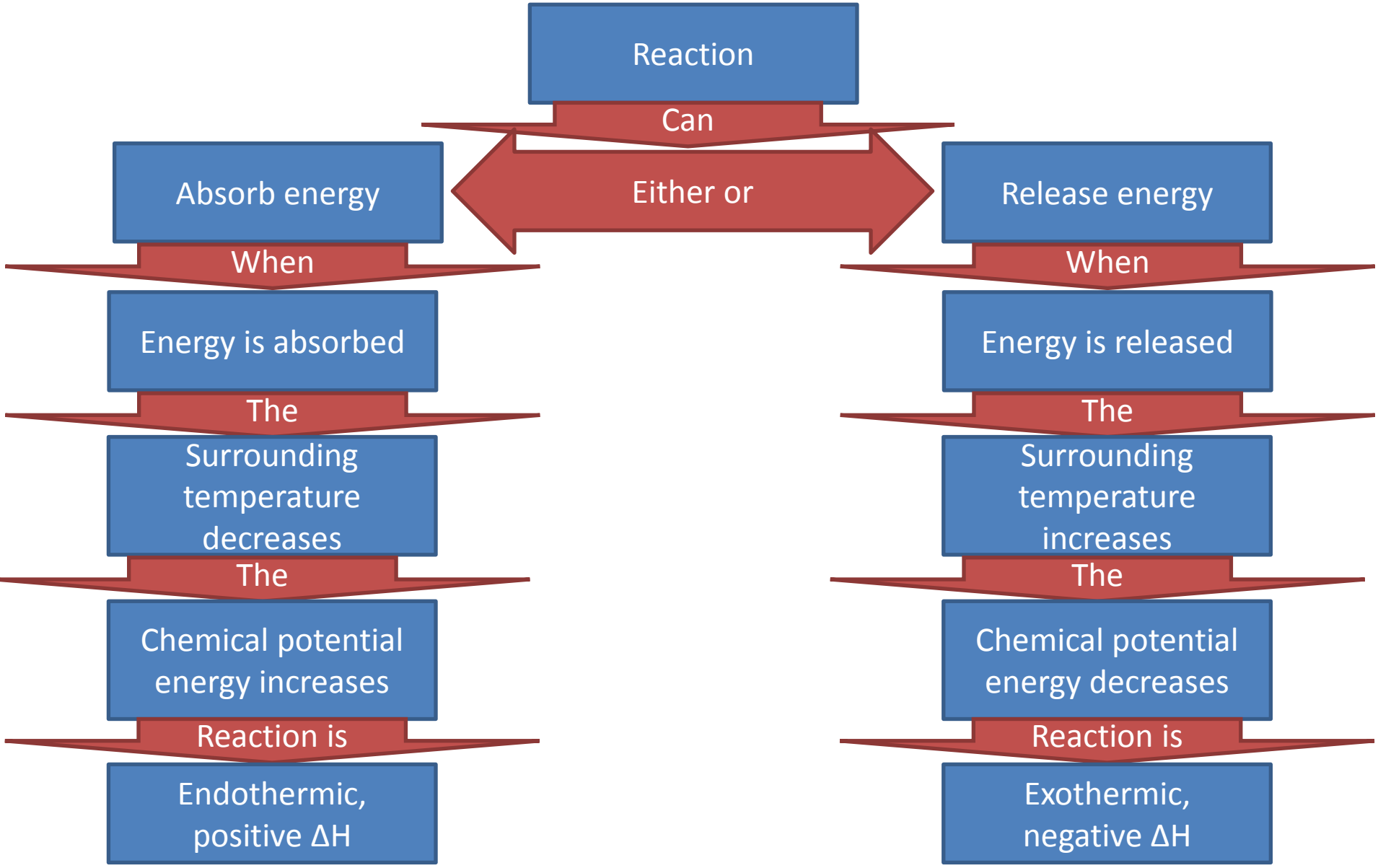
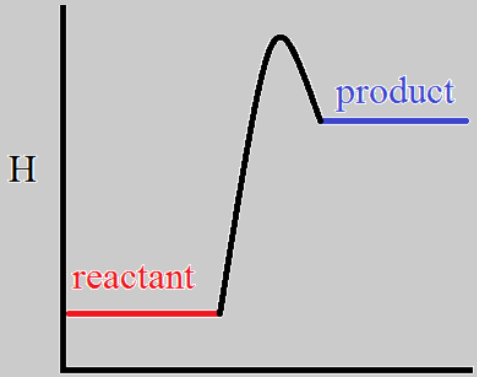
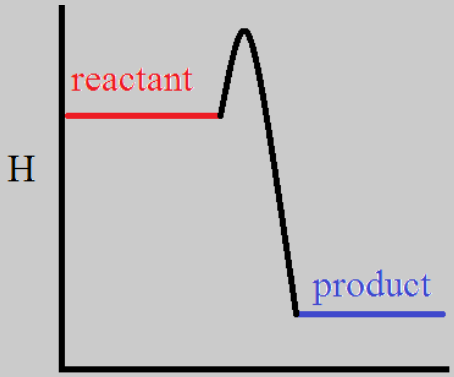
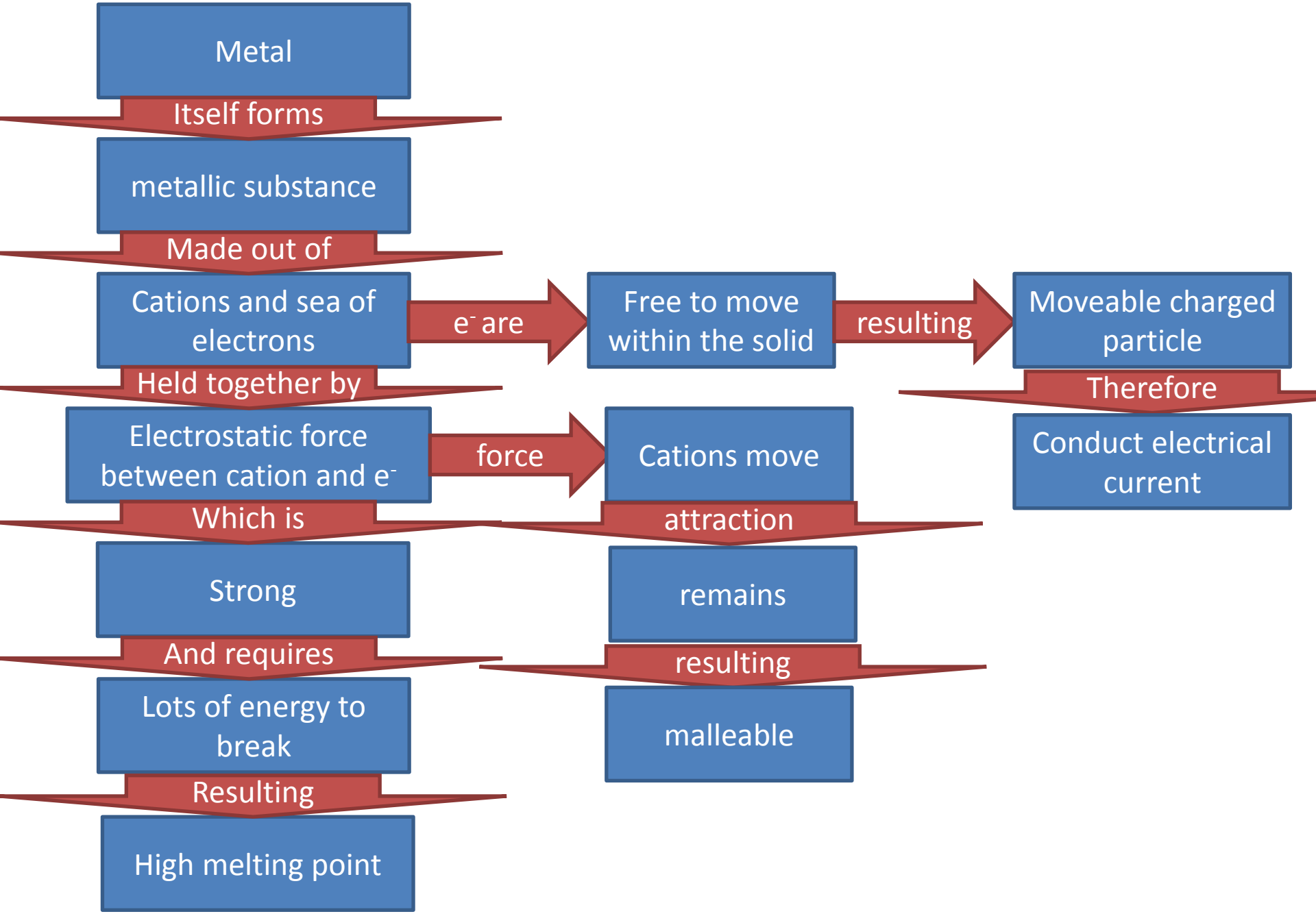
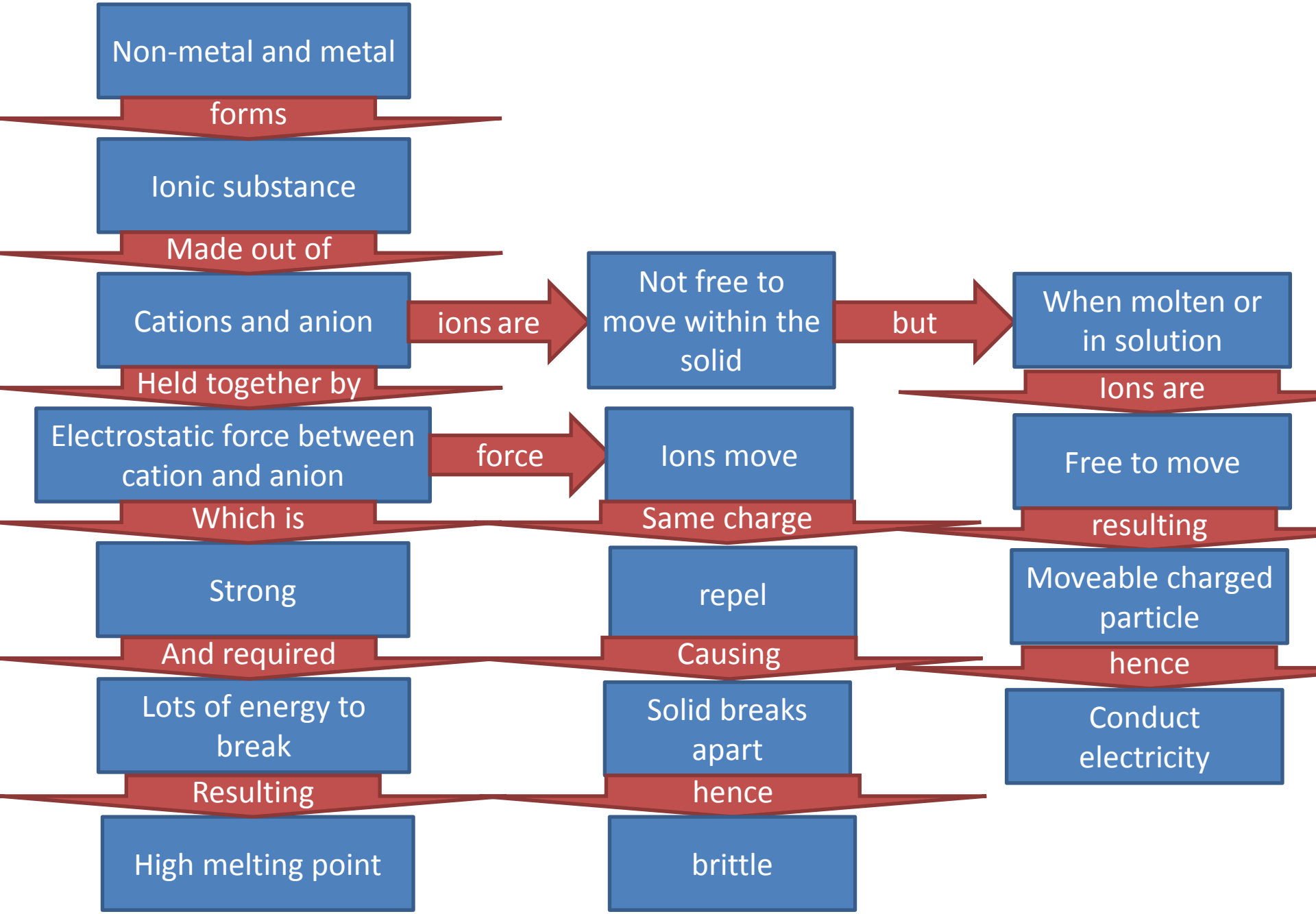
Chemistry 2.4
Structure, bonding and Thermodynamics

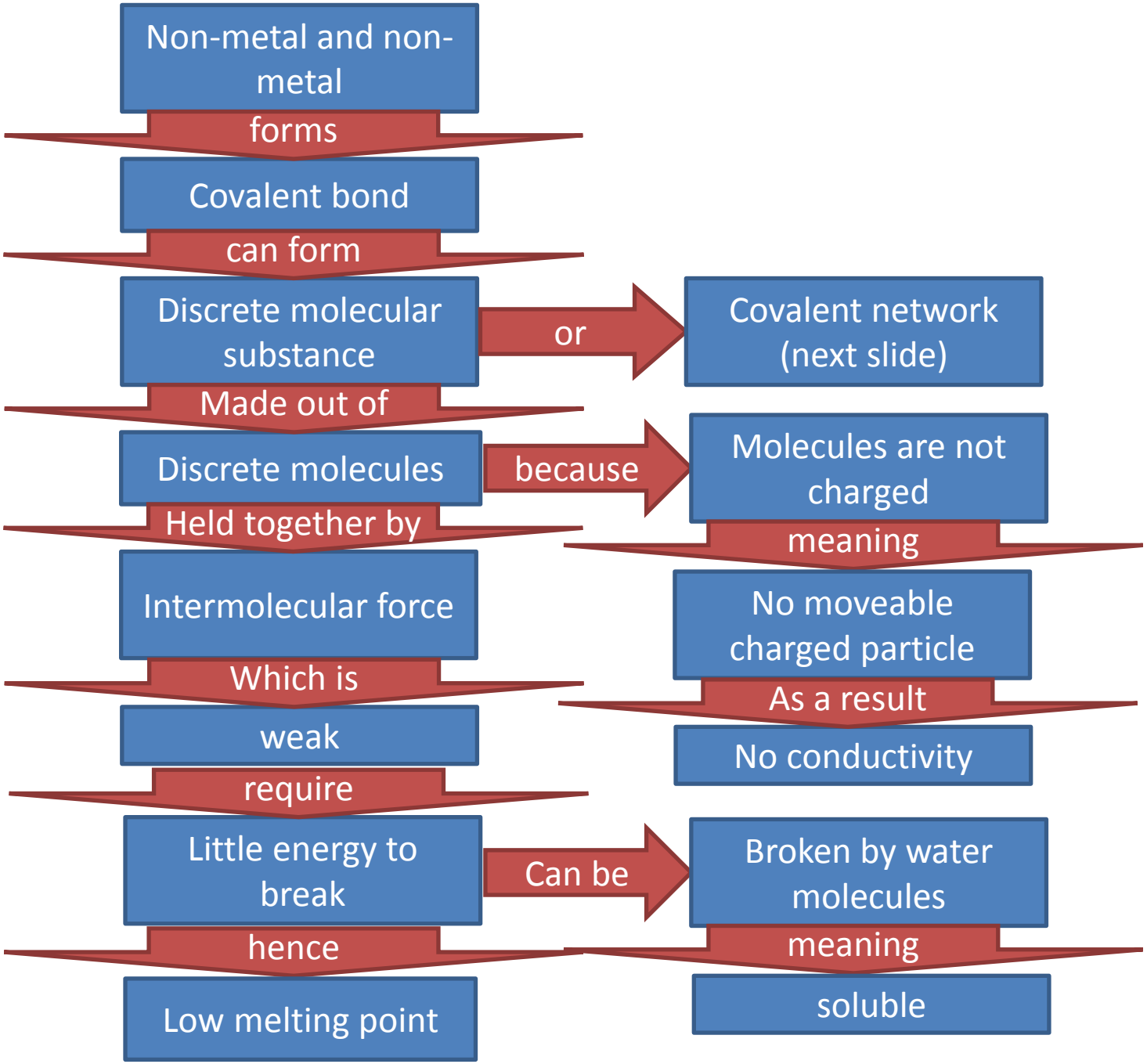
Summary flow chart

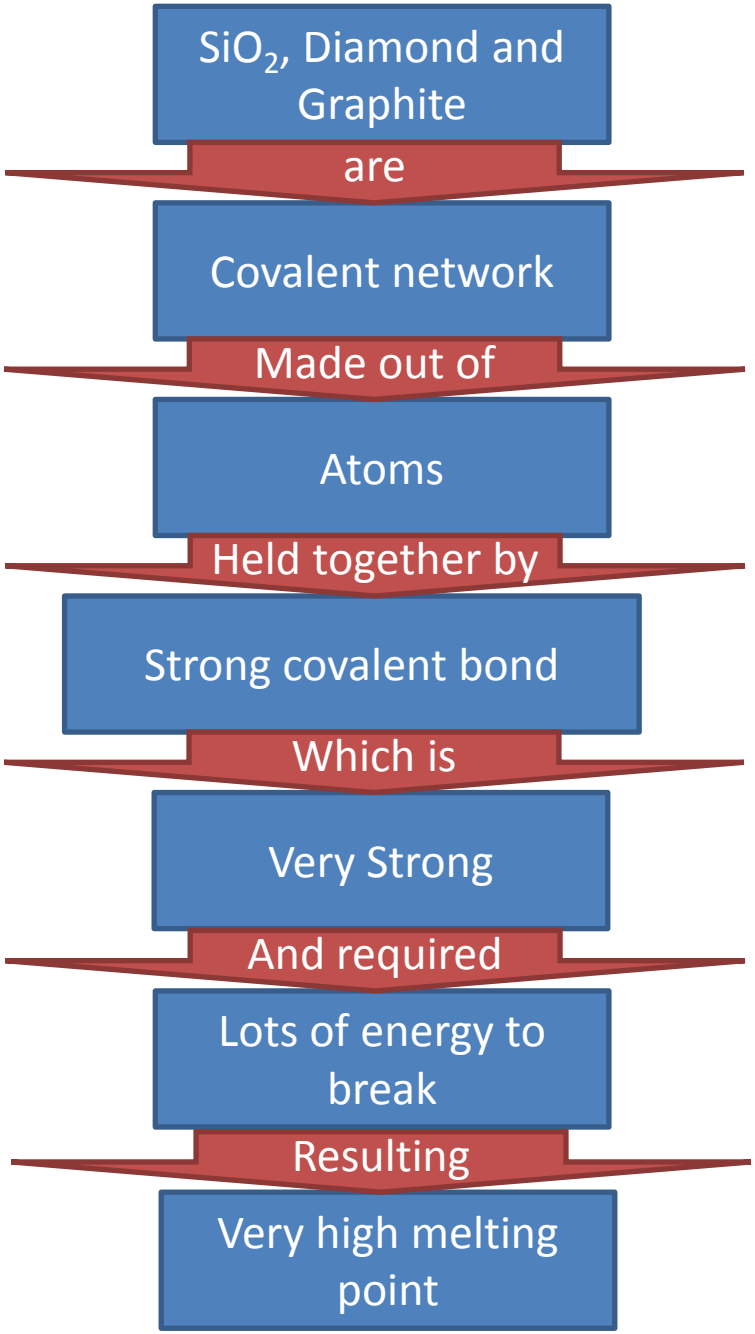

Reaction
Can
Either or
Absorb energy
When
Energy is absorbed
The
Surrounding temperature decreases
The
Chemical potential energy increases
Reaction is
Endothermic, positive ΔH
Release energy
When
Energy is released
The
Surrounding temperature increases
The
Chemical potential energy decreases
Reaction is
Exothermic, negative ΔH

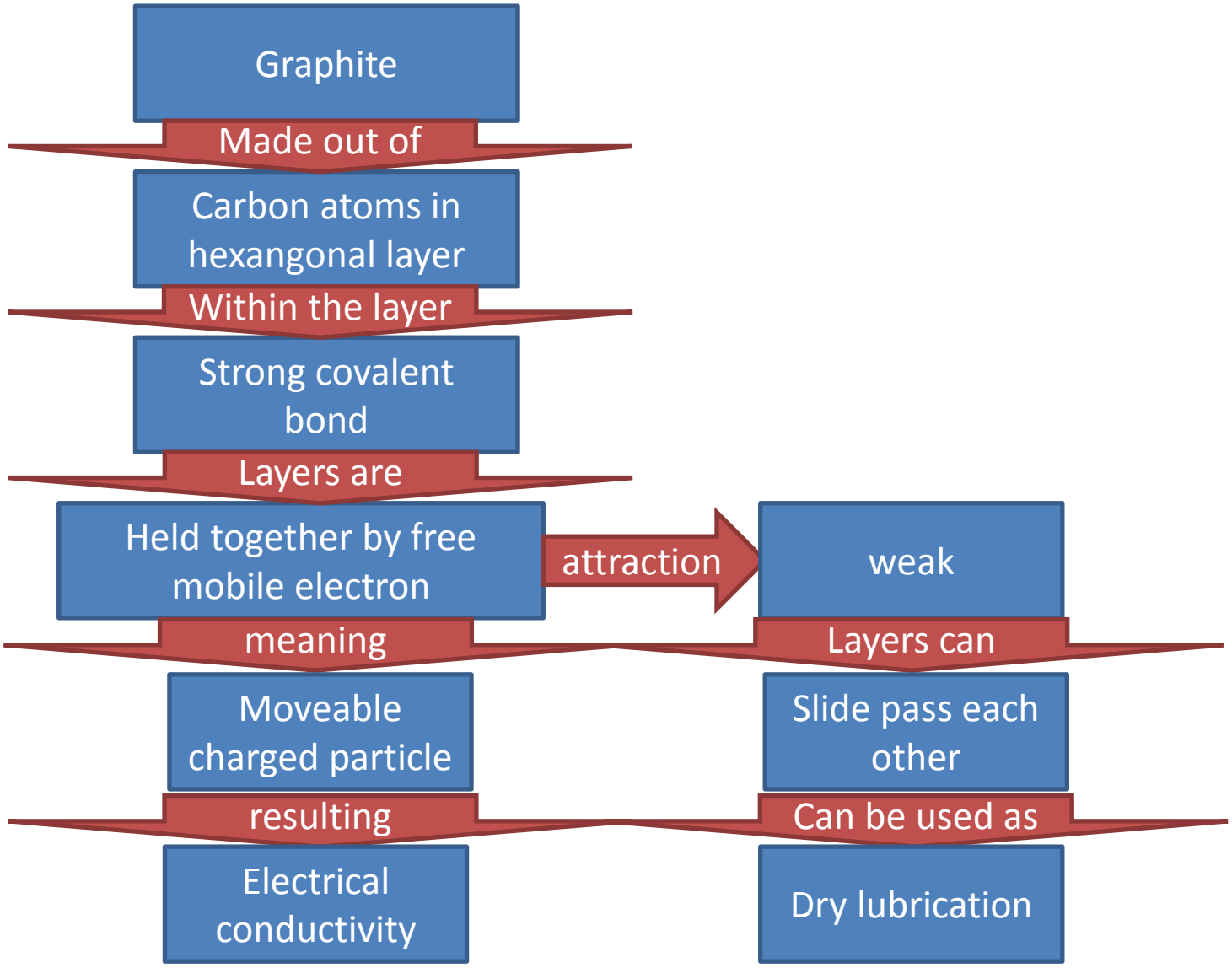
Molar Mass $\frac{m}{n} = M = g\ mol^{-1} = \frac{g}{mol}$	**Concentration** $\frac{n}{V} = c = molL^{-1} = \frac{mol}{L}$
Enthalpy $H = \frac{E}{n} = kJmol^{-1} = \frac{kJ}{mol}$	**Specific heat** $\Delta E = m \times s \times \Delta T = J = g \times J\ g^{-1}\ {}^{o}C \times {}^{o}C$
Density of water $1\ g\ mL^{-1} = 1\ kg\ L^{-1}$	**Bond Energy** $\Delta H = \sum BE_{(reactants)} - \sum BE_{(products)}$
Endothermic reaction 	**Exothermic reaction** 


Metal
Itself forms
metallic substance
Made out of
Cations and sea of electrons
e- are
Free to move within the solid
resulting
Moveable charged particle
Held together by
Therefore
Electrostatic force between cation and e-
force
Cations move
Conduct electrical current
Which is
attraction
Strong
remains
And requires
resulting
Lots of energy to break
malleable
Resulting
High melting point


Non-metal and metal
forms
Ionic substance
Made out of
Cations and anion
ions are
Not free to move within the solid
but
When molten or in solution
Held together by
Ions are
Electrostatic force between cation and anion
force
Ions move
Free to move
Which is
Same charge
resulting
Strong
repel
Moveable charged particle
And required
Causing
hence
Lots of energy to break
Solid breaks apart
Conduct electricity
Resulting
hence
High melting point
brittle


Non-metal and non-metal
forms
Covalent bond
can form
Discrete molecular substance
or
Covalent network (next slide)
Made out of
Discrete molecules
because
Molecules are not charged
Held together by
meaning
Intermolecular force
No moveable charged particle
Which is
As a result
weak
No conductivity
require
Little energy to break
Can be
Broken by water molecules
hence
meaning
Low melting point
soluble


SiO_2, Diamond and Graphite
are
Covalent network
Made out of
Atoms
Held together by
Strong covalent bond
Which is
Very Strong
And required
Lots of energy to break
Resulting
Very high melting point


Graphite
Made out of
Carbon atoms in hexangonal layer
Within the layer
Strong covalent bond
Layers are
Held together by free mobile electron
attraction
weak
meaning
Layers can
Moveable charged particle
Slide pass each other
resulting
Can be used as
Electrical conductivity
Dry lubrication