Equations

# Concentration, molar mass, mols, volume

## Input:

* Element1
  + Molarmass: *mmass1*
  + Mass: *mass1*
  + Volume: *vol1*
  + Concentration: *con1*
  + Mol: *mol1*
* Element2
  + Molarmass: *mmass2*
  + Mass: *mass2*
  + Volume: *vol2*
  + Concentration: *con2*
  + Mol: *mol2*

## Calculation:

Mmass1=mass1/mol1

Mmass1=mass1/(con1\*vol1)

Mass1=mmass1\*mol1

Mass1=mmass1\*con1\*vol1

Vol1=con1\*mol1

Vol1=con1\*(mass1/mmass1)

Con1=mol1/vol1

Con1=mass1/(mmass1\*vol1)

Mol1=mass1/mmass1

Mol1=con1\*vol1

## Min required info for computation of…

* Mmass1
  + Mass1 & mol1
  + Mass1 & con1 & vol1
* Mass1
  + Mmass1 & mol1
  + Mmass1 & con1 & vol1
* Vol1
  + Con1 & mol1
  + Con1 & mmass1 & mass1
* Con1
  + Mol1 & vol1
  + Mass1 & mmas1 & vol1
* Mol1
  + Mass1 & mmass1
  + Con1 & vol1

# Temperatures

## Input:

* Element1
  + Temperature K: TempK1
  + Temperature C: TempC1
  + Temperature F: TempF1

## Calculation:

TempK1=TempC1+273.15

TempK1=(TempF-32)\*5/9

TempC1=TempK1-273.15

TempC1=(TempF-32)\*5/9

TempF1=TempC1\*5/9+32

TempF1=(TemplK1-273.15)+273.13\*5/9

## Min required info for computation of…

* TempK1
  + TempC1
  + TempF1
* TempC1
  + TempK1
  + TempF1
* TempF1
  + TempC1
  + TempK1

# Percentage composition

## Input:

* Element1
  + Composition by mass=pm1
  + Composition by mol=pn1
  + Mol=mol1
  + Mass=mass1
  + Concentration =con1
  + Volume=vol1
  + Molarmass=mmass1
* Element2
  + Mol=mol2
  + Mass=mass2
  + Concentration=con1
  + Volume=vol1
  + Molarmass=mmass1

## Calculation:

Comm1=(mass1/mass2)\*100%

Comn1=(mol1/mol2)\*100%

## Min required info for computation of…

* Comm1
  + Mass1 & mass2
  + Mmass1 & mol1 & mass2
  + Mmass1 & con1 & vol1 & mass2
  + Mmass2 & mol2 & mass1
  + Mmass2 & con2 & vol2 & mass1
* Comn1
  + Mol1 &mol2
  + Mass1 & mmass1 & mol2
  + Con1 & vol1& mol2
  + Mass2 & mmass2 & mol1
  + Con2 & vol2 & mol1

# Percent yield & loss

## Input:

* Element1
  + Yield=yie1
  + Theoretical yield=tyie1
  + Percentage yiled=pyie1
  + Percentage loss =plos1

## Calculation:

Pyie1=yie1/tyie1

Plos1=(tyie1-yie1)/tyie1

## Min required info for computation of…

* Pyie1
  + Yie1 & tyie1
* Tlos1
  + Yie1 & tyie1

# Ideal gas equation

## Input:

* Element1
  + Pressure = pre1
  + Volume = vol1
  + Mols = mol1
  + Temperature in k = TempK1
  + Gas constant = R = 8.3145 J/mol K

## Calculation:

Pre1=(mol1\*R\*TempK1)/Vol1

Vol1=(mol1\*R\*TempK1)/Pre1

Mol1=(Pre1\*Vol1)/(R\*Tempk1)

Tempk1=(Pre1\*Vol1)/(Mol1\*R)

## Min required info for computation of…

* Pre1
  + Mol1 & Tempk1 & Vol1
* Vol1
  + Mol1 & Tempk1 & Pre1
* Mol1
  + Pre1 & Vol1 & Tempk1
* Tempk1
  + Pre1 & Vol1 & Mol1

# Boyle’s law

## Input:

* Element1
  + Pressure = pre1
  + Volume = vol1
  + Mols = constant
  + Temperature in k = constant
* Element2
  + Pressure = pre2
  + Volume = vol2

## Calculation:

Pre1=(pre2\*vol2)/vol1

Vol1=(pre2\*vol2)/pre1

Pre2=(pre1\*vol1)/vol2

Vol2=(pre1\*vol1)/pre2

## Min required info for computation of…

* Pre1
  + Vol1 & pre2 & vol2
* Vol1
  + Pre1 & pre2 & vol2
* Pre2
  + Pre1 % vol1 & vol2
* Vol2
  + Pre1 & vol1 & pre2

Constant *T* and *n*

# Charles’ law

## Input:

* Element1
  + Pressure = constant
  + Volume = vol1
  + Mols = constant
  + Temperature in k = tempk1
* Element2
  + Volume = vol2
  + Temperature in k =tempk2

## Calculation:

Vol1=(vol2/tempk2)\*tempk1

Tempk1=(vol1\*tempk2)/vol2

Vol2=(vol1/tempk1)\*tempk2

Tempk2=(vol2\*tempk1)/vol1

## Min required info for computation of…

* Vol1
  + Tempk1 & vol2 & tempk2
* Tempk1
  + Vol1 & vol2 & tempk2
* Vol2
  + Vol1 & tempk1 & tempk2
* Tempk2
  + Vol1 & tempk1 & vol2

Constant *P* and *n*

## Avogadro’s law

## Input:

* Element1
  + Pressure = constant
  + Volume = vol1
  + Mols = mol1
  + Temperature in k = constant
* Element2
  + Volume = vol2
  + Mols = mol2

## Calculation:

Vol1=(vol2/mol2)\*mol1

Mol1=(vol1\*mol2)/vol2

Vol2=(vol1/mol1)\*mol2

Mol2=(vol2\*mol1)/vol1

## Min required info for computation of…

* Vol1
  + Mol1 & vol2 & mol2
* Mol1
  + Vol1 & vol2 & mol2
* Vol2
  + Vol1 & mol1 & mol2
* Mol2
  + Vol1 & mol1 & vol2

Constant *P* and *T*

# Heat change

## Input:

* Element1
  + Quantity of heat = q1
  + Mass = mass1
  + Temperature = tempc1
  + Change in temperature = tempc2-tempc1 = dtempc1
  + Specific heat capacity = shc1
* Element 2
  + Temperature = tempc2

## Calculation:

Q1=mass1\*dtempc1\*shc1

Mass1=q1/(dtepmc1\*shc1)

Shc1=q1/(mass1\*dtempc1)

Dtempc1=q1/(mass1\*shc1)

## Min required info for computation of…

* Q1
  + Mass1 & dtempc1 & shc1
* Mass1
  + Q1 & dtempc1 & shc1
* Shc1
  + Q1 & mass1 & dtempc1
* Dtempc1
  + Tempc2 – tempc1
  + Q1 & mass1 & shc1

# Arrhenius equation

## Input:

* Element1
  + Rate constant = rc1
  + Pre-exponential factor = pef1
  + Activation energy (energy activation) = ea1
  + Gas constant = R = 8.3145 J/mol K
  + Temperature in K = tempk1

## Calculation:

Rc1=pef1\*e^(-ea1/(R\*t))

Pef1=rc1/e^(-ea1/(R\*t))

## Min required info for computation of…

* Rc1
  + Pef1 & ea1 & tempk1
* Pef1
  + Rc1 & ea1 & tempk1
* Ea1
  + Rc1 & pef1 & tempk1
* Tempk1
  + Rc1 & pef1 & ea1

# Activation energy

## Input:

* Element1
  + Rate constant = rc1
  + Activation energy (energy activation) = ea1
  + Gas constant = R = 8.3145 J/mol K

## Calculation:

Ea1=-ln(rc1)\*R

Ln(rc1)=-(ea1/R)

## Min required info for computation of…

* Ea1
  + Ln(rc1)