# Today in Chemistry History

COMPOUND INTEREST

## 19th February – Svante Arrhenius's birthday (1859)

### Svante Arrhenius

**Born**

19 February 1859

**Died**

2 October 1927

$$k = Ae^{-\frac{E_a}{RT}}$$

Arrhenius is considered to be one of the founders of physical chemistry, and is best known for his eponymous equation which shows the relationship between the temperature of a reaction and its rate.

## The Arrhenius equation: What is it and why is it useful?

**Constant, e**

Value = 2.71828

**Rate constant**

Varies with temperature. The greater the value of the rate constant, the faster the rate of the reaction.

**Frequency factor**

Collisions per second with the correct orientation to react. Assumed to be constant over small temperature ranges. Varies for different reactions.

$$k = Ae^{-\frac{E_a}{RT}}$$

**Activation energy**

The amount of energy required for the reaction to occur. Usually in kilojoules per mole, but must be in joules per mole here.

**Temperature**

Measured in Kelvin. To get to Kelvin from Celsius, add 273.

**Molar gas constant**

A constant that appears in a number of physical equations. Value = 8.314 J $K^{-1}$ $mol^{-1}$

**Why is this useful?**

The rate constant is present in the equation to work out the overall rate of a reaction – how quickly the reactants are being converted into products. The general equation shown below is used.

$$Rate = k[A]^m[B]^n$$

k = rate constant;
[A] and [B] are the concentrations of reactants A & B; m and n are orders of reaction (determined experimentally).

Additionally, if we already know the value of the rate constant, we can use it in the Arrhenius equation to help determine the activation energy of the reaction (how much energy is required for it to occur).