
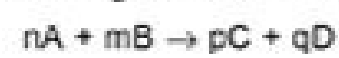


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1. For a general chemical transformation



$$\text{Rate} = -\frac{1}{n} \frac{d[A]}{dt} = -\frac{1}{m} \frac{d[B]}{dt} = +\frac{1}{p} \frac{d[C]}{dt} = +\frac{1}{q} \frac{d[D]}{dt}$$

2. For elementary chemical reaction



$$\text{Theoretical rate} = \frac{dx}{dt} = k[A]^m \times [B]^n$$

3. For a general reaction:  $aA + bB \rightarrow \text{Products}$

$$\text{Rate} = \frac{dx}{dt} = k[A]^m \times [B]^n$$

Order of reaction w.r.t. A = m overall order of reaction = (m + n)

Order of reaction w.r.t. B = n

4. Unit of rate constant = (mole)<sup>1-n</sup> (litre)<sup>n-1</sup> time<sup>-1</sup>

where, n = order of reaction

5. For a zero order reaction:  $A \rightarrow B$

$$\text{Rate} = -\frac{d[A]}{dt} = k[A]^0 = k \text{ (constant)} \quad K = \frac{[A_0] - [A]}{K}$$

6. For a first order reaction:  $A \rightarrow B$

$$\text{Rate} = -\frac{d[A]}{dt} = k[A]$$

$$k = \frac{2.303}{t} \log_{10} \frac{[A]_0}{[A]_t} = \frac{2.303}{t} \log_{10} \left( \frac{a}{a-x} \right)$$

7. For a zero order reaction,  $t_{1/2} = \frac{[A]_0}{2k}$

$$\text{For a first order reaction, } t_{1/2} = \frac{0.693}{k}$$

$$\text{For an } n^{\text{th}} \text{ order reaction, } t_{1/2} \propto \frac{1}{[A]_0^{n-1}} \text{ (for } n \geq 2 \text{)}$$

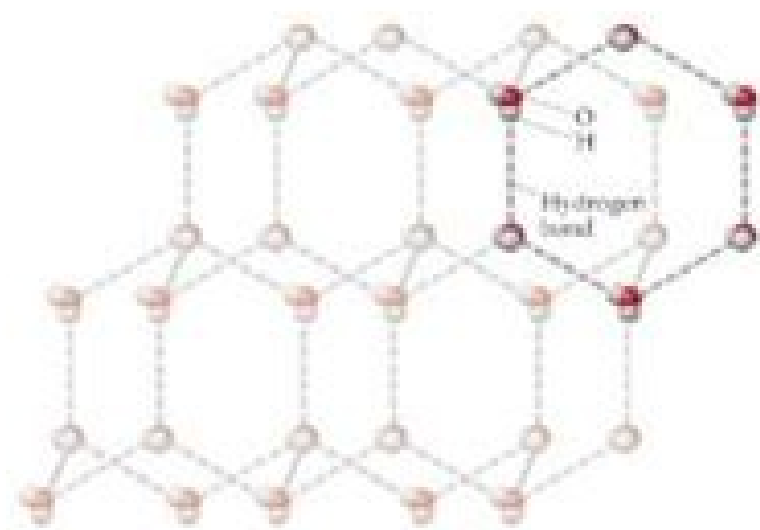
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AP Chemistry

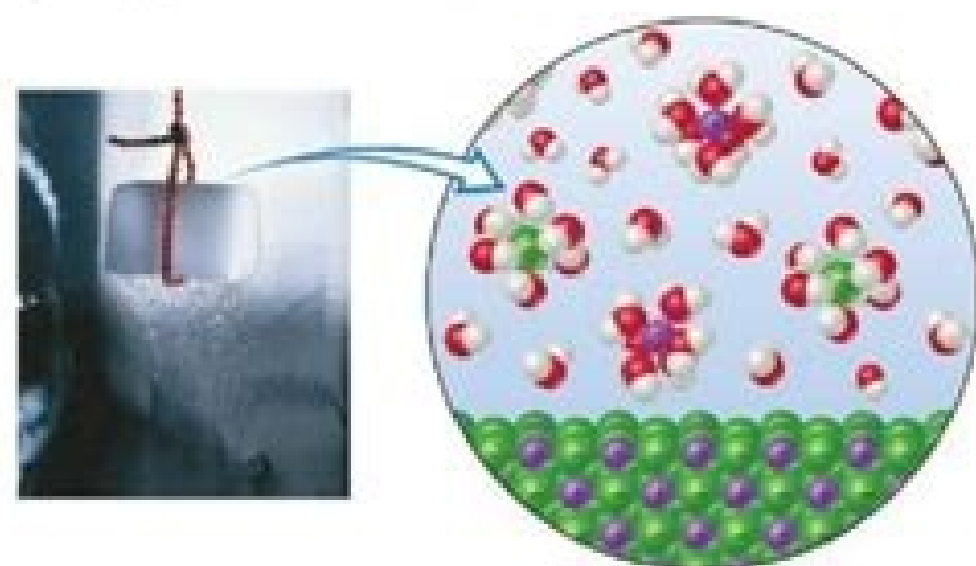
Chapter 19 Chemical Thermodynamics

**Making Qualitative Predictions About  $\Delta S$**

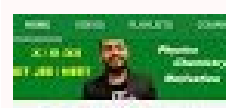
- In most cases an increase in the number of microstates (and thus entropy) parallels an increase in:
  - temperature
  - volume
  - number of independently moving particles.
- Consider the melting of ice.
  - In the ice, the molecules are held rigidly in a lattice.
  - The intermolecular attractions in the three dimensional lattice restrict the molecules to vibrational motion only.
  - When it melts, the molecules have more freedom to move ( $\uparrow$  degrees of freedom).
  - The molecules are more randomly distributed.



- Consider a KCl crystal dissolving in water.
  - The solid KCl has ions in a highly ordered arrangement.
  - crystal dissolves  $\rightarrow$  the ions have more freedom  $\rightarrow$  more randomly distributed.
  - However, now the water molecules are more ordered.
  - Some must be used to hydrate the ions.
  - Thus this example involves both ordering and disordering.
  - The disordering usually predominates (for most salts).



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Class 11 Chapter 01  
Some Basic Concepts  
Of Chemistry 01

Edit Vendor

VENDOR NAME: Vendor's Name

CURRENT BALANCE: 0.00

How do I adjust the current balance?

Address Info

COMPANY NAME: DBAVENDOR'S COMPANY NAME

FULL NAME: MR./MS./ M.I. NAME

JOB TITLE:

Main Phone: Main Email:

Work Phone: CC Email:

Mobile: Website:

Fax: Other 1:

ADDRESS DETAILS

BILLED FROM: DBAVENDOR'S COMPANY NAME VENDOR NAME

SHIPPED FROM:

Copy >>

Vendor is inactive

OK Cancel Help

These two will show on the 1099

