

#### Science Introduction Workshop 2

### Chemistry ह्यार्श्वेरित्रे वापा



### Acids and Bases: An Introduction

श्चिम् इस्याद्यात्या इस्यूरी

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For thousands of years people have known that vinegar, lemon juice, and many other foods taste sour. However, it was not until a few hundred years ago that it was discovered why these things taste sour – because they belong to one class of substances: they are all acids or mixtures that contain acid substances. (The term acid, in fact, comes from the antique Latin language term *acidus*, which means, "sour").

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In the seventeenth century, the Irish amateur chemist Robert Boyle first labeled substances as either acids or bases according to the following characteristics:

**Acids** taste sour, are corrosive to metals, change litmus (a dye indicator) red, and become less acidic when mixed with bases.

Bases feel slippery, change litmus blue, and become less basic when mixed with acids.

Other classes of substances: There are many substances which are neither acids nor bases.

**Acids**: In the late 1800s, the Swedish scientist *Arrhenius* proved that water can dissolve many compounds and that in solutions produce hydrogen-ions.

#### Acid → electrically charged H-Particles

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श्चराइया → ग्रॅन्।धराठवान्त्री:पराद्वरः (H) हुपा

**Bases** – as Arrhenius found – dissolve as well in water and become electrical conductors, mostley by releasing hydroxide particles OH<sup>-</sup> into solution. For example, a typical base according to the Arrhenius definition is Milk of Magnesia, Mg(OH)<sub>2</sub>:

#### Base → electrically charged OH-Particles

결때.토회

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र्थल. ईश्रा → धूर्या. धिर. इथ. ब्री. OH र्था

# 2. Neutralization র ৄ র্ট্রস্থান্রবানর্নার্ক্রমানর্নার্ক্রমানর্নার্ক্রমান্ত্রান্ত্রা

If we mix an acid and base together, the H-particle would combine with the OH particle to make the molecule H<sub>2</sub>O, that is plain water. A base can make an acid weaker, and vice versa. This chemical reaction is called neutralization.

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H-Particle + OH-Particle  $\rightarrow$  H<sub>2</sub>O H  $\xi^{\alpha |}$  + OH  $\xi^{\alpha |}$   $\rightarrow$  H<sub>2</sub>O



The neutralization reaction of an acid with a base will always produce water, whereas the rest of the particles form – after evaporation of water, a salt.

## 3. Indicators ২ বৃ বৃহস্ক্রিউজ্জ্

Some natural or synthetic colors change color in the presence of bases or of acids. They can therefore be used as indicators. One such indicator is *Litmus*; it shows two colors, red for acids, blue for bases. Another one is called *Universal indicator*, it shows many different colors depending on the strength of an acid or a base. Its "rainbow"-colors are: red, orange, yellow, greenish, green, blue.