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Central School

Home School Package

**Year :12**



**HOME SCHOOL PACKAGE CONTENT**



**LESSON Plan**

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| G:\Home Learning Packages\Documents for SHEFA Schools Principal\teacher-computer-icons-school-test-education-teaching.jpg Teacher | Name :Judy W VireSubject : Chemistry |
| G:\Home Learning Packages\Documents for SHEFA Schools Principal\download.jpg Date | Week 8 of term 2 |
| G:\Home Learning Packages\Documents for SHEFA Schools Principal\title.jpg | Topic : Chemistry of Aqueous solutionsLesson number : 1 |
| Learning outcomesLearning outcomes | * Define acid and base using Arrhenius, Bronsted –Lowry and Lewis model
* Describe properties of acids and bases
* Describe reactions of acids and bases.
* Write balanced equations for the reactions that occur above
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| TopicIntroduction | **Highlights*** The role of acid/basic nature of supports was studied.
* Acid–basic properties of supports affected the selectivity of products.
* The doping of another weak basic site affected the selectivity to glyceric acid.
* The role of supports in affecting the selectivity of products was proposed.
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| Catch | Catch phrase for the lesson**Insight into effect of acid/base nature of supports** |
| Learners notes 1Learners notes | SummaryArrhenius, Bronsted-Lowry, and Lewis Acids and Bases in Organic ChemistryArrhenius Bronsted-Lowry Lewis Acids and BasesCategories of Acids and BasesAcids and bases will fall under **one or more** of the following three categories:1. Arrhenius acids/bases
2. Bronsted-Lowry acids/bases
3. Lewis acids/bases

The key here is to recognize that while each classification has a specific definition, any given molecule can fall into more than one category, some into all 3. Again, something we’ll look at later in this article.Arrhenius AcidAn Arrhenius acid is a molecule that when dissolved in water will donate an H+ in solution. Simply put, a proton donor.The trick to recognizing an Arrhenius acid is to look for a molecule that starts with an H, and typically contains an oxygen or halogen.Common examples of Arrhenius acids include:* Hydrochloric Acid – HCl
* Nitric Acid – HNO3
* Sulfuric Acid – H2SO4
* Acetic Acid – HCH3CO2
* and so many more…

An acid dissociating in water does not form a free-floating proton. Instead one of the water molecules in solution will grab the H+ yielding a hydronium or H3O+ ion. Here’s what happens when nitric acid dissociates in water.HNO3 H+ NO3- Nitric Acid Dissociation EquationArrhenius BaseAn Arrhenius base is a molecule that when dissolved in water will break down to yield an OH- or hydroxide in solution. To recognize the Arrhenius base look for a molecule ending in OH, but not following CHx which refers to an alcohol.Arrhenius base examples include:* Sodium hydroxide – NaOH
* Potassium hydroxide – KOH
* Magnesium hydroxide – Mg(OH)2
* and so many more…

Mg(OH)2 to Mg2+ 2OH- Magnesium Hydroxide base dissociationBut what if the acid/base is not dissolved in water?The Arrhenius definition for acids and bases only refers to compounds dissolved in water. Does this mean that acids and bases cannot exist out of water? Not quite, that’s where the Bronsted-Lowry definition comes in.Bronsted-Lowry AcidA Bronsted-Lowry acid, like an Arrhenius acid, is a compound that breaks down to give an H+ in solution. The only difference is that the solution does not have to be water. We can still refer to the exact same acids as listed for the Arrhenius acid examples, but this time we’ll change the solvent to ammonia, alcohol, or anything else.We saw what happens when nitric acid (HNO3) dissolves in water. Now let’s see what happens when it dissolves in ammonia (NH3) or even methanol (CH3OH)HNO3 dissociation in NH3 and CH3OHNitric acid still dissolved to yield an H+ and NO3-, but this time it was NH3 and not water that picked up the free-floating proton.Bronsted-Lowry BaseThis is where we start to see the difference between the Bronsted-Lowry and Arrhenius definitions. While the Arrhenius base referred specifically to the hydroxide (OH-) ion, the Bronsted-Lowry base refers to any atom or ion capable of accepting or bonding to a free proton in solution.Referring back to the HNO3 + NH3 reaction above, when ammonia picks up the free H+ it acts as a proton-acceptor. NH3 is the Bronsted-Lowry base in this example.Additional examples include:* Methanol – CH3OH
* Formaldehyde – H2CO
* And even water – H2O

Lewis Acids and basesThe Lewis definition for acids and bases is the most extreme because it’s not dealing with protons specifically. Instead the Lewis definition deals with the movement of electrons.Lewis AcidA Lewis acid refers to an atom or molecule that accepts an electron pair. Think back to your ‘pushing arrows’ for orgo mechanisms. Every time you draw an arrow representing the movement of electrons, the atom getting attacked or accepting those electrons is the Lewis acid in that reaction.Common Lewis Acid Examples* Borane – BH3 (hydroboration reaction)
* Aluminum Chloride – AlCl3 (electrophilic aromatic substitution reaction)
* Iron (III) Bromide – FeBr3 (electrophilic aromatic substitution reaction)
* and our good friend H+ (keep reading)

FeBr3 Lewis AcidLewis BaseSince the Lewis definition has to do with the transfer of electrons, you can guess by now that a Lewis Base is an electron pair donor. Once again think back to your reaction mechanisms. The molecule using its electrons to attack another atom is an electron pair donor and a Lewis Base.Here is the first step in [acid catalyzed hydration](http://leah4sci.com/acid-catalyzed-hydration-of-alkenes/). The pi bond attacking H+ makes the alkene a Lewis Base.Alkene pi bond lewis base**Arrhenius Acid Definition:**Hydronium breaks up to yield an H+ in solution.**Arrhenius Base Definition:**Hydroxide is an OH- dissolved in water.**Bronsted-Lowry Acid Definition:**Hydronium is an H+ donor regardless of solution**Bronsted-Lowry Base Definition:**Hydroxide attacks and accepts the H+ from hydronium.**Lewis Acid Definition:**The H+ on Hydronium accepts the attacking electron pair to form a bond.**Lewis Base Definition:** Hydroxide donates its electron pair to form a bond between itself and H+Reactions of Acids and Base1. Acid reacts with a metalWhen an **acid** reacts with **metal**, a salt and hydrogen are produced: **acid** + **metal** → salt + hydrogen Eg : nitric **acid** + calcium → calcium nitrate + hydrogen The salt that is produced depends upon which **acid** and which **metal react**.2. Acids reacts with Metal carbonate When **acids react** with **carbonates**, such as calcium **carbonate** (found in chalk, limestone and marble), a salt, water and carbon dioxide are made which is an exothermic reaction. * acid + metal carbonate → salt + water + carbon dioxide

Eg: Sulfuric acid + iron(II) carbonate → iron(II) sulfate + water + carbon dioxide H2SO4 + FeCO3 → FeSO4 + H2O + CO23. Acids reacts with a base When acids react with a base, a salt and water are made.* acid + base → salt + water
* nitric acid + magnesium oxide → magnesium nitrate + water

 2HNO3 + MgO → Mg(NO3)2 + H2OAlso note that the reaction of metal oxides with acids is exothermic (ie heat energy is given out).4. Acid reacts with metal oxides A salt and water are produced when acids react with metal oxides. Metal oxides are bases, because they neutralise acids.In general: acid + metal oxide → salt + waterFor example: sulfuric acid + copper(II) oxide → copper(II) sulfate + water H2SO4(aq) + CuO(s) → CuSO4(aq) + H2O(l) |
|  | * Reaction of acids with metal carbonates by Khan Academy [https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419:in-in-acids-bases-and-salts/x87dd2847d57ee419:in-in-reaction-of-acids-and-bases/v/reaction-of-acids-with-metal-carbonates-and-bicarbonates-chemistry-khan-academy](https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419%3Ain-in-acids-bases-and-salts/x87dd2847d57ee419%3Ain-in-reaction-of-acids-and-bases/v/reaction-of-acids-with-metal-carbonates-and-bicarbonates-chemistry-khan-academy)
* Metal and non-metal oxides reacting with acid and bases by Khan Academy [https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419:in-in-acids-bases-and-salts/x87dd2847d57ee419:in-in-reaction-of-acids-and-bases/v/metal-and-non-metal-oxides-reacting-with-acids-and-bases-chemistry-khan-academy](https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419%3Ain-in-acids-bases-and-salts/x87dd2847d57ee419%3Ain-in-reaction-of-acids-and-bases/v/metal-and-non-metal-oxides-reacting-with-acids-and-bases-chemistry-khan-academy)
* Acid and Base definition <https://www.youtube.com/watch?v=EyBkPwsRY2E>
 |
|  | 1. Define acid and base using Arrhenius, Bronsted –Lowry and Lewis model
2. Describe four properties of acids
3. Decribe four properties of bases
4. Describe reactions of acids and bases.
5. Write balanced equations for the reactions that occur above
6. Complete the following word equation:

 (acid + metal → salt + hydrogen) 1. hydrochloric acid + \_\_\_\_\_\_\_\_\_\_\_→ calcium chloride + hydrogen
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + magnesium → magnesium nitrate + water
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| Assignment |  |
| Assessment | Detemine the strength of an acids or base using universal indicator. A List of base/acids will be provided |
| Reference ClipartReferences | * <http://leah4sci.com/arrhenius-bronsted-lowry-and-lewis-acids-and-bases-in-organic-chemistry>
* <https://www.bbc.co.uk/bitesize/guides/z7g26yc/revision/1>
* [https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419:in-in-acids-bases-and-salts/x87dd2847d57ee419:in-in-reaction-of-acids-and-bases/v/reaction-of-acids-with-metal-carbonates-and-bicarbonates-chemistry-khan-academy](https://www.khanacademy.org/science/in-in-class-10-chemistry-india/x87dd2847d57ee419%3Ain-in-acids-bases-and-salts/x87dd2847d57ee419%3Ain-in-reaction-of-acids-and-bases/v/reaction-of-acids-with-metal-carbonates-and-bicarbonates-chemistry-khan-academy)
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**WEEKLY CHECKLIST For Parents**:

Term: 2 Week number 1 Date…… to…… Month: …………

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| --- | --- | --- | --- | --- | --- |
| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 2 Date…… to…… Month: …………

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| --- | --- | --- | --- | --- | --- |
| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 3 Date…… to…… Month: …………

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| --- | --- | --- | --- | --- | --- |
| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 4 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 5 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 6 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
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Term: 2 Week number 7 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
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Term: 2 Week number 8 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
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Term: 2 Week number 9 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 10 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 11 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 12 Date…… to…… Month: …………

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| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |

Term: 2 Week number 13 Date…… to…… Month: …………

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| --- | --- | --- | --- | --- | --- |
| **Subject** |  **Number of lessons** | **Days**  | **Tick when activity is complete** | **Parents comment**  | **Signature** |
|  | **1** |  |  |  |  |
|  | **2** |  |  |  |  |
|  | **3** |  |  |  |  |
|  | **4** |  |  |  |  |
|  | **5** |  |  |  |  |
|  | **6** |  |  |  |  |