

School of Nursing

Course Code : 2002

Course Name: PPG



ANTACIDS

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PH IN THE BODY

- The body controls pH in cells and extra-cellular fluid
 - Changes in H⁺ concentration have significant effects on activity of molecules
 - Especially catalysts/enzymes
- The Gastro-intestinal (GI) tract generates and maintains different pH environments along its length
 - pH is very important for controlling activity of digestive enzymes



ACIDITY IN THE STOMACH

- Acidity in the stomach is normal, but excess acidity is potentially harmful
- It is unusual compared to other organs as its pH is as low as 1-2
 - Due to production of hydrochloric acid from structures in lining of walls = gastric glands
- Acid environment kills bacteria that comes in with food, is optimum for activity of digestive enzymes



EXCESS ACID

- Factors that cause excess production of gastric juice (acidic secretion)
 - Excess alcohol
 - Smoking
 - Stress
 - Some anti-inflammatory drugs
- Leads to problems such as:
 - Acid indigestion: feeling of discomfort due to too much acid in stomach
 - Heartburn: acid from stomach rising into oesophagus
 - A.K.A. acid reflux
 - Ulcer: damage to lining of stomach wall, resulting in loss of tissue and inflammation

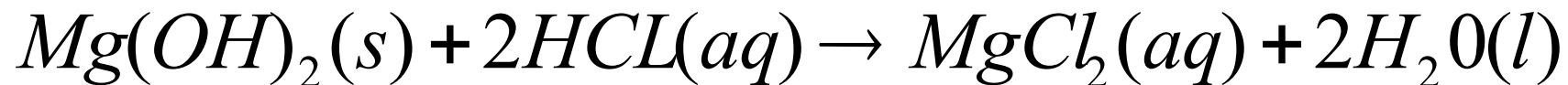
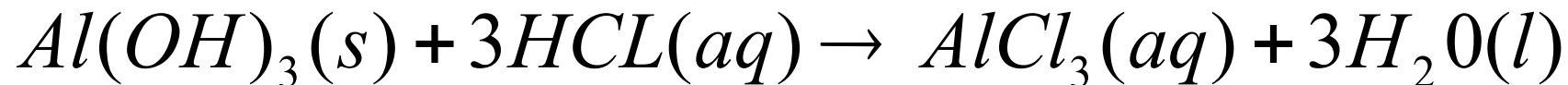


HOW TO COMBAT EXCESS ACID

- Drugs that help combat excess acid are called antacids
- They are weak bases that neutralize excess acid
- Usually weakly basic compounds, often metal oxides or hydroxides, carbonates or hydrogencarbonates
 - React with hydrochloric acid to produce a salt and water
- **note that these drugs do not directly coat ulcers or induce healing, but allow stomach lining time to mend



Example Antacid Reactions:



Typical Neutralization Reaction



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- Several contain both aluminum and magnesium because they complement each other
- Magnesium salts are faster acting
- Aluminum compounds take longer to dissolve but have longer lasting relief
- Magnesium salts act as a laxative, whereas aluminum salts cause constipation
- Aluminum has been linked with Alzheimer's so intake should be limited



OTHER ANTACIDS

- Others contain metal carbonates and hydrogen carbonates which react to produce a salt, water, and carbon dioxide
- Carbon dioxide can cause bloating of the stomach and flatulence
 - To avoid this, antifoaming agents such as dimethicone are often added
- Some also contain alginates which float to the top of the stomach, which prevents reflux into oesophagus



Example Antacid Reactions:



MORE SIDE EFFECTS/ CAUTIONS

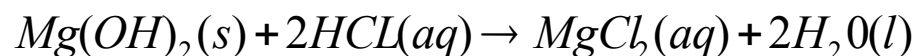
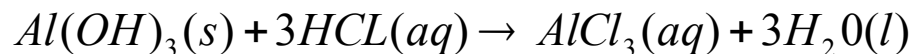
- Since antacids change the pH of the stomach, they can alter the absorption of other drugs
- They should **NEVER** be taken for an extended period without medical supervision



EXERCISE 3

- Magnesium hydroxide and aluminum hydroxide can act as antacids

- A) Write an equation for the reaction of hydrochloric acid with each of these antacids



- B) Identify which antacid neutralizes the greater amount of acid if 0.1 mol of each antacid is used.
 - $\text{Al}(\text{OH})_3$ reacts with H^+ in a mole ratio of 1:3; $\text{Mg}(\text{OH})_2$ reacts with H^+ in a mole ratio of 1:2 so 0.1 mol $\text{Al}(\text{OH})_3$ will neutralize the greater amount of
- C) Suggest why potassium hydroxide is not used as an antacid
 - KOH is a strong alkali so would be dangerous for body cells; it is corrosive and would upset the pH



REFERENCES

- <https://www.healthline.com/health/antacids>
- <https://www.healthline.com/health/antacids>

