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Using Popular Movies, Television Shows, Novels, and Analogies, as Teaching Tools for Chemistry

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Uses of Popular Media

- ▶ Use examples from popular media in class
 - ▶ Use material for exam and quiz questions

 - ▶ Show clips during class
 - ▶ Assign movie for a course
 - ▶ Assign papers for a course
-

Bonding and Antibonding Sneetches



Spongebob Squarepants



- ▶ Dirty Bubble
- ▶ Awesome Surface Tension

Dimitri Martin



- ▶ Melting of Ice
 - ▶ Physical Change
-

Zorba Pastor On Your Health



- ▶ Aluminum “Molecules?!”
- ▶ Assessment
 - ▶ Atom versus molecule

Red Dwarf



- ▶ Lithium Carbonate
 - ▶ Antidepressant
 - ▶ Gas tank
-

Das Boot



- ▶ Acid in the Bilge
- ▶ Litmus paper
 - ▶ Chlorine gas????
 - ▶ Hydrogen chloride
- ▶ Lime
 - ▶ Acid/base chemistry
- ▶ Density
 - ▶ We have to get the water out

Recently Viewed Historical Shows



- ▶ **White Phosphorous**
 - ▶ Patton 360
 - ▶ Ken Burns Civil War
 - ▶ M*A*S*H
 - ▶ Emergency
- ▶ **Carbon dioxide**
 - ▶ Commanders at War
 - ▶ USS Yorktown

Doc Martin PBS



- ▶ Alcohol
- ▶ Diabetic shock
 - ▶ Ketone Bodies
- ▶ Breathalyzer
 - ▶ Ethanol
 - ▶ 3-Hydroxybutyrate

John Pinette



- ▶ **This ain't bread!**
 - ▶ Jelly rolls off
 - ▶ Butter slides off
 - ▶ Scotchgard
 - ▶ Can't toast it
 - ▶ **Intermolecular interactions**
 - ▶ Hydrogen bonding
 - ▶ London dispersion forces
 - ▶ **Fluorocarbon coated ceramic**
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Twelve Angry Men



- ▶ Different experiences
 - ▶ Careful observations
 - ▶ Debating ideas
 - ▶ Biases
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The Salad Bar Analogy



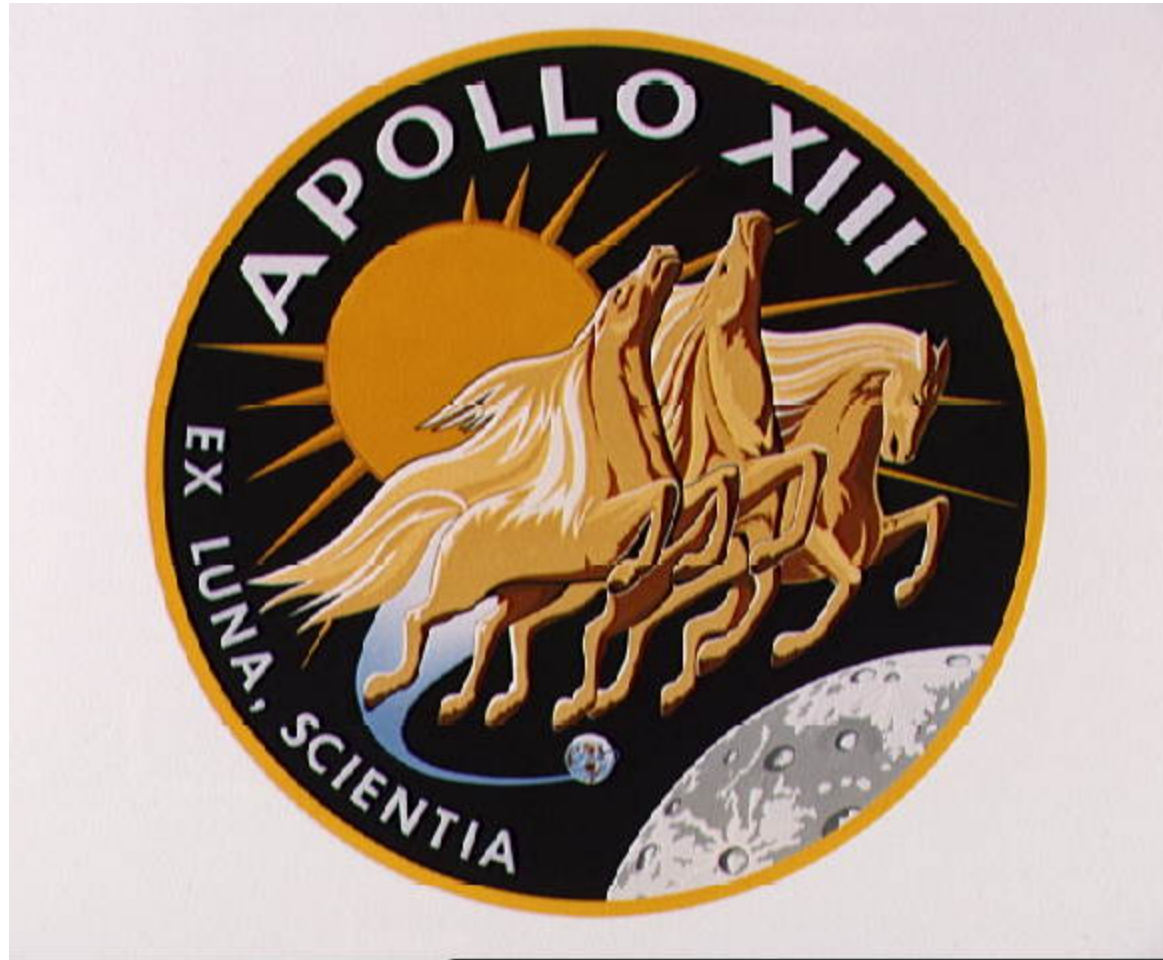
- ▶ **Chromatography**
 - ▶ **Bar--Stationary Phase**
 - ▶ Interaction of patrons with food and drink
 - ▶ **Line--Mobile Phase**
 - ▶ Length of line, Impatient patrons
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The Cookie Analogy



- ▶ Cookie – Substrate
 - ▶ Mouth – Active site
 - ▶ Enzyme kinetics
 - ▶ Inhibition
 - ▶ Competitive and noncompetitive
 - ▶ Reversible and irreversible
 - ▶ Feedback
 - ▶ Reaction reversibility
-

Apollo 13 Mission Patch



Hypotheses and Observations

- ▶ Okay, Houston we've had a problem here
 - ▶ Observations
 - ▶ Spacecraft movement
 - ▶ Audible bang
 - ▶ Loss of electrical power
 - ▶ Computer restart
 - ▶ Communication reset
 - ▶ Initial hypotheses
 - ▶ Instrument failure--sensors
 - ▶ Cabin repressurization valve
 - ▶ Meteor hit the spacecraft
 - ▶ Additional observations
 - ▶ Gas venting
 - ▶ Visible damage
-

Chemistry Topics Taught

- ▶ **Kinetics**
 - ▶ Insulation burning
 - ▶ Concentration of oxygen
 - ▶ **Supercritical fluid**
 - ▶ **Gas laws**
-

Chemistry Topics Taught

- ▶ Lithium hydroxide
 - ▶ Chemical reactions
 - ▶ Gas law
 - ▶ Carbonate blood buffer
 - ▶ Base solution and dry ice demonstration
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Types of Fuels

- ▶ **First stage**
 - ▶ Kerosene and oxygen
 - ▶ **Second and third stages**
 - ▶ Hydrogen and oxygen
 - ▶ **Thrusters**
 - ▶ Hydrazine, 1,1-dimethyl hydrazine
 - ▶ Nitrogen dioxide-Dinitrogen tetroxide
 - ▶ Hypergolic
 - ▶ **Ignition source/activation energy**
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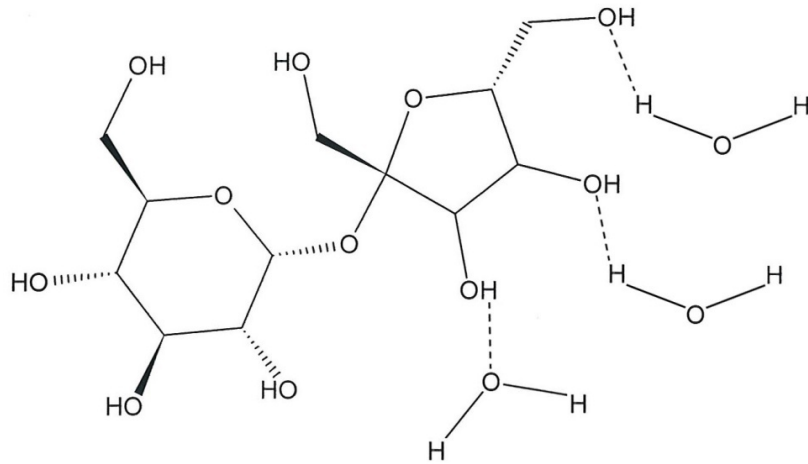
October Sky/Rocket Boys



Topics Taught

- ▶ **Body of knowledge**
 - ▶ Trial and error
 - ▶ **Propellant systems**
 - ▶ Homogeneous
 - ▶ Materials
 - ▶ **Inspiration from a teacher**
 - ▶ **Skilled machinists**
-

Problems with Rockets

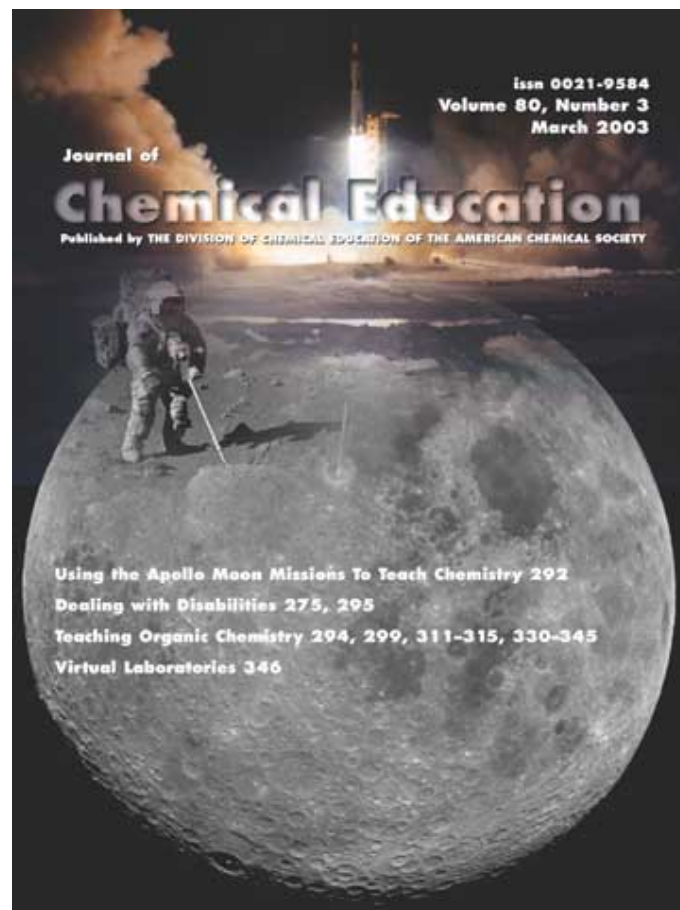


- ▶ Uneven combustion
- ▶ Oxidation of materials used for rockets

Propellant Systems

<u>Type of Mixture</u>	<u>Organic</u>	<u>Oxidant</u>	<u>Added Reductant</u>
Gunpowder	Charcoal	KNO_3	Sulfur
Rocket Candy	Sugar	KNO_3	None
Zincoshine	Ethanol	Sulfur	Zinc powder
Solid Rocket Booster	Polymer and Epoxy	NH_4ClO_4	Aluminum powder

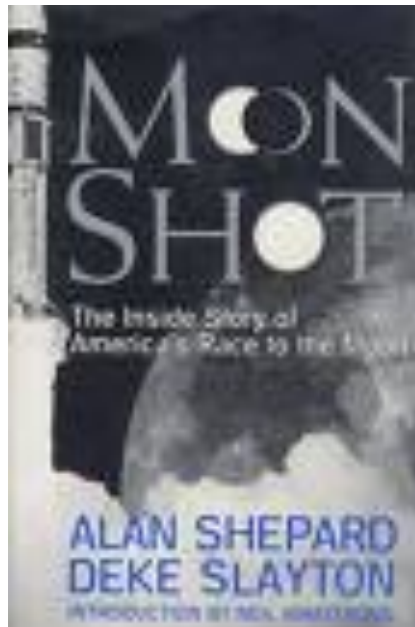
From the Earth to the Moon



Chemistry Topics Taught

- ▶ Electrolytes - ions increase electrical conductivity even in air
 - ▶ Accuracy and relative error
 - ▶ 535 feet
 - ▶ Educated observer
 - ▶ Crystalline rock
 - ▶ Orange soil
 - ▶ Problem solving
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Moonshot



Chemistry Topics Taught

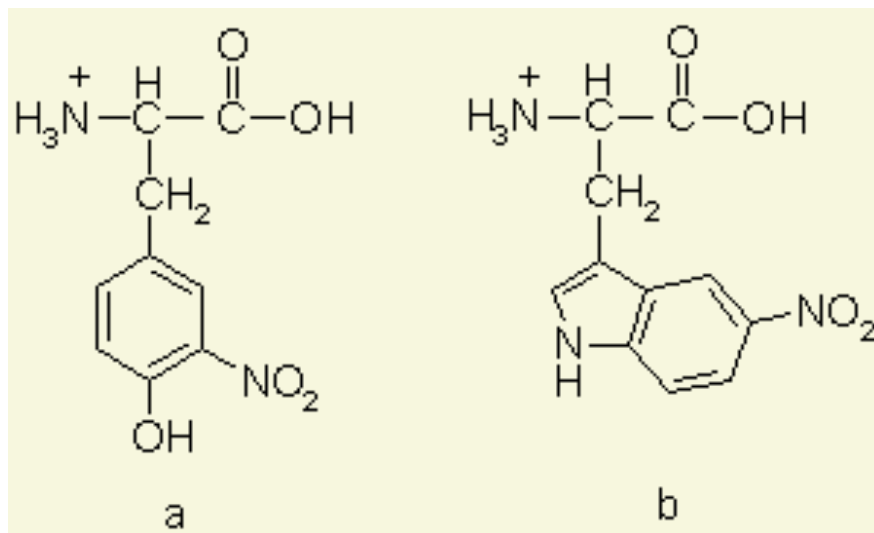
- ▶ **Docking - Analogy**

- ▶ Requirements of a chemical reaction
 - ▶ Collision
 - ▶ Orientation
 - ▶ Energy
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Girls with Yellow Hands

- ▶ World War I munitions workers
 - ▶ TNT poisoning
 - ▶ Discoloration
 - ▶ Headaches
 - ▶ Dilation of blood vessels
 - ▶ Chemistry of yellow hands
 - ▶ Nitration demonstration
 - ▶ Safety
 - ▶ Discussion of equipment and ventilation
-

Chemistry Causing the Yellow Hands



This is Sparta/AP 2008



Books on Relating Chemistry and Popular Media



Coauthors

- ▶ B. J. Woods
 - ▶ Stacie Mundringer
 - ▶ Jenifer Ley
 - ▶ Amy Schiebel
 - ▶ Tarah Nytes
 - ▶ Dolores Snell
 - ▶ Lindsay Wilkinson
-

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May 2009.
