

Teaching Chemistry Using Television, Movies, and Novels

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Zinc

- Chemistry and Engineering News
 - Zinc oxide nanoparticles in sunscreens



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Food and Cooking

- Good Eats
 - Acidity
 - Properties of water
 - Toxicity
 - Osmotic pressure
 - Supersaturated solutions
- Top Chef
 - Molecular Gastronomy
- Unwrapped
 - Making candy — heat to make a supersaturated solution of sugar-water
 - Heat to evaporate excess water
 - Zinc oxide used to give candy a white color
- Crave
 - Maillard reaction

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Published Examples Using Popular Media to Teach Chemistry

Published Examples

- Apollo 13
 - Structure and reactivity
 - Kinetics and thermodynamics
 - Scientific methodology
- From the Earth to the Moon
 - Observation
 - Precision and accuracy
 - Solution conductivity
- October Sky/Rocket Boy
 - Fuels and oxidants
 - Careful record keeping
- Girls with the Yellow Hands
 - Safety
 - Nitration of aromatics



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Incorrect uses of terminology

- Dirty Jobs
 - Beaker not flask
 - Nuclear driving
- History Channel
 - Carbon-14 "molecule" used in radioactive dating
 - "Element" of water
- Discovery Channel
 - "Element" of methyl mercury
- Skinny Bitch
 - Superoxide "molecule"



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Food and Cooking

- Cooking for Geeks
 - Intramolecular Forces
 - Chemical and physical changes while cooking
- Garlic and Other Alliums: The Lore and the Science
 - Compounds the cause tearing
- Food, Inc.
 - Use of ammonia to kill E. Coli
 - Pink Slime



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Other Examples

- Lorenzo's Oil (Don Wink)
 - Control group/controls
 - Enzyme/substrates
 - Addition to the body of knowledge
- Doc Martin
 - Internet resources
 - Hypothesis
 - Lead (Energy) and methanol (biofuel) poisoning
 - Ketosis/diabetes
- Phineas and Ferb
 - Zinc
 - Solubility
 - Biological uses
 - Nanoparticles
- John Pinette
 - Structure-Property relationship
 - No bones, jaw missing, Scotch guard/diff
 - Space shuttle vls
 - Control material



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Student Assignment

- Find a popular media example that can be used to teach a chemical concept.
 - For full credit it must be new to the instructor.
- Multiple attempts of submissions allowed since duplicate examples are possible
- Courses
 - General Chemistry
 - Inorganic Chemistry

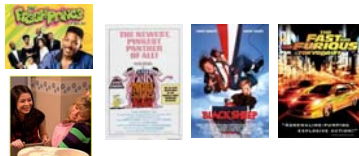
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Truth Serum sodium pentothal, sodium amytal



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Nitrous oxide Laughing gas and oxidant



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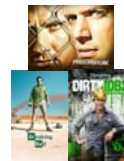
Science Fiction and Fantasy



- › **Farscape**
 - › Calcium "fuel" and water to cause an explosion, what is correct and what is misinformation
- › **Stargate Universe**
 - › CO₂ Scrubbers
- › **The Hunger Games**
 - › Purification of water by adding iodine
- › **Lost**
 - › Dangers of nitroglycerine and dynamite

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Other Television Shows



- › **Prison Break**
 - › Thermite reaction of iron oxide and aluminum
- › **Breaking Bad**
 - › Fulminated mercury as an explosive — Hg(CNO)₂
- › **Dirty Jobs**
 - › Wine making/Tartaric acid

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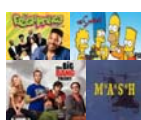
Books



- › **Skinny Bitch**
 - › Metabolism products
 - › Reactive oxygen species
- › **Poisoner's Handbook**
 - › Cyanide poisoning Hemoglobin
 - › Alcohol metabolism
 - › Carbon monoxide
 - › Arsenic
- › **The Teeth of the Tiger**
 - › Succinylcholine for an assassination
 - › Muscle relaxant — paralysis
- › **Watching Acts**
 - › Making methamphetamine

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Sitcoms



- › **The Simpsons**
 - › Laws of thermodynamics
 - › Oxidize
- › **Fresh Prince of Bel-Air**
 - › Acid and water
- › **The Big Bang Theory**
 - › Properties of cornstarch and water
 - › Bicarbonate-acid reaction
 - › Particle-wave duality
 - › Entropy
- › **M*A*S*H**
 - › White phosphorus

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Other Television Shows



- › **Myth Busters**
 - › Turning a propane tank into a rocket
 - › Methane explosion
- › **ER**
 - › Carbon monoxide poisoning and pressure chamber treatment
- › **Ice Road Truckers**
 - › Freezing point depression
 - › Explosives
 - › MSDS sheets — Safety

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Programs for youth



- › **The Magic School Bus**
 - › Molecules
 - › How soap works
- › **As Told by Ginger**
 - › Salt and Ice — freezing point depression
- › **SpongeBob Squarepants**
 - › Surface tension

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Crime Investigation



- › **Bones**
 - › Making CO₂ Scrubbers
 - › Crystallization
 - › Mass spectrometry
 - › Hydrofluoric acid
- › **Sherlock**
 - › Green Fluorescence Protein
 - › Viscosity
- › **CSI: Miami**
 - › Radioactive isotope of iodine
- › **CSI**
 - › Gel electrophoresis to pinpoint DNA segments

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Movies: Comedy and Musicals



- › **Grease**
 - › Chemistry of lead ion in hair dye
- › **Legally Blonde**
 - › Ammonium thioglycolate used in hair dye
- › **Wizard of Oz**
 - › Melting — Dissolving
 - › Potassium chlorate, para-nitroaniline, lactose
- › **Best in Show**
 - › Sodium hypochlorite — Bleach

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Movies: Drama



- › **Boondock Saints**
 - › Hydrolysis reaction to destroy DNA
 - › Reaction with nitrazes and liquid paraffin to test for gunshot residue
- › **Alcatraz**
 - › Phogene and protective gear
- › **Blow**
 - › Making point depression-measure of purity
- › **The Rock**
 - › Sarin gas

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Common Concepts in Popular Media

- › 1 Soap
- › 2 Baking soda/vinegar
- › 3 Ketoacidosis — Diabetes
- › 4 Explosives
- › 5 Poisons
- › 6 Drugs

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Acknowledgements

- › Katherine Olson
- › Thank you for your time and attention
- › Questions

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Movies: Drama



- › **National Treasure**
 - › Making invisible ink that can be seen only with black light
- › **Primer**
 - › Argon gas used to create an inert environment
- › **The Run Diaries**
 - › Distillation of alcohol
- › **Fight Club**
 - › Making Soap
 - › Sodium hydroxide with water to cause a skin burn

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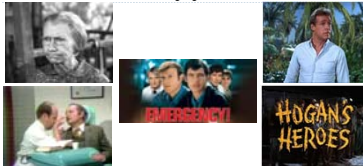
Movies: Drama



- › **Sherlock Holmes**
 - › Ion channels
 - › Cyanide
- › **Erin Brockovich**
 - › Hexavalent chromium due to industrial waste
- › **The Life of David Gale**
 - › Execution by pancuronium bromide and potassium chloride
- › **Law Abiding Citizen**
 - › KCl used in lethal injection
 - › Poisoning — tetrodotoxin causing paralysis by blocking action potentials in nerves

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Television from my youth



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