Hannah Sheets
Per. 6
CP Physical Science
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Research Notes: Glow Sticks and Glow in the Dark Objects

Glow Sticks:

- ➔ Snapping glow sticks kicks off chemical process that eventually leads to colored light
- ➔ 2 separate compartments with 2 separate chemical solutions
- ➔ Most glow sticks contain the solution diphenyl oxalate mixed along with dye of desired color
- ➔ Other solution = hydrogen peroxide
- ➔ ^ Contained in an inner glass cylinder
- ➔ Cylinder separates 2 solutions so they don't react w/ each other
- ➔ When you break glass cylinder, 2 chemicals mix/react and create glow
- ➔ Diphenyl oxalate is oxidised by hydrogen peroxide which produces unstable compound 1,2- dioxetanedione
- ➔ Unstableness leads to decomposing into carbon dioxide + releases energy
- ➔ Electrons in molecules of dye can absorb the energy given off by 1,2- dioxetanedione, they then are in an "excited" state
- ➔ When electrons fall back to their "ground state" (original energy) they lose their energy in form of photons of light
- ➔ ^ Process called chemiluminescence
- ➔ Exact energy of light given off is dependent on structure of molecule + allows diff. colors to be exposed
- ➔ Range of diff. chemicals can be used as well as diff. types of dyes
- ➔ Molecules of dye are always present in solution
- ➔ Diphenyl oxalate + hydrogen peroxide slowly used up by reaction until 1 runs out and reaction ceases
- ➔ ^ At this point glow stick stops glowing
- ➔ Glow sticks should not be cut open
- ➔ Reaction of 2 solutions can produce small amounts of phenol as a byproduct
- ➔ Skin contact can result in irritation or dermatitis (red, swollen, sore, blistering skin)
- ➔ Reactions influenced by temperature- Warm temp. = accelerate rate of reaction & cool temp. = decreased rate of reaction
- ➔ ^ That's why putting glow sticks in freezer can make them last longer

(http://www.compoundchem.com/2014/10/14/glowsticks/)

Glow-in-the-Dark Objects:

- ➔ Most glow in the dark objects need to be charged
- ➔ All glow in the dark products contain phosphors
- ➔ Phosphor = substance that radiates visible light after being energized