Chemicals Gone Funny

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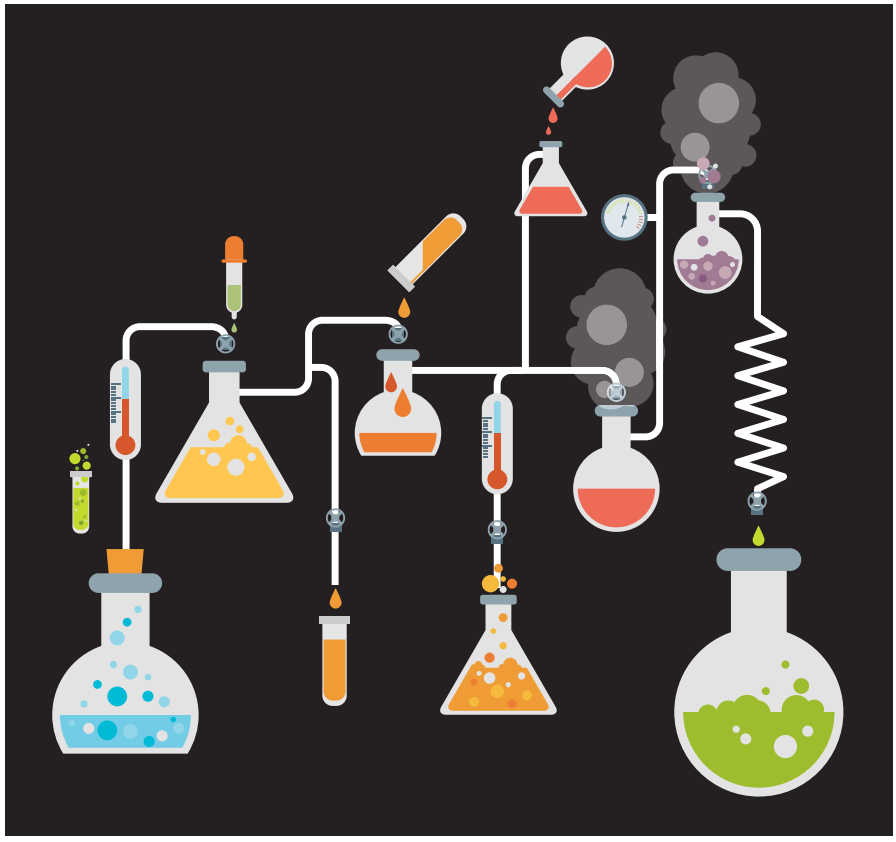
Using humor in the classroom at any level can be a gamble for teachers and most have probably experienced students collectively rolling their eyes at a corny joke. Puns, of course, frequently elicit that response along with the almost requisite group groan. Yet this ancient and simple form of humor can effectively impart a message if carefully worded, although any attempt at a science pun relies on the teacher first ensuring students understand the scientific principles tied to the humor. Telling a class that you feel sorry for copper sulfate—because it was feeling blue—may still produce a groan or two, but the chemical fact that copper compounds possess a characteristic color may just be reinforced and imprinted on the students' minds more permanently.

The following collection of original chemical puns is therefore designed to not only amuse students but to illustrate a chemical fact or property pertaining to a variety of chemical substances and their use in a physical science or chemistry course will vary with grade level. In the above example, students may be first made aware that copper compounds are blue from a textbook photograph, a teacher demonstration, or a lab experiment, but the science must precede the pun if the teacher has any hope of provoking a chuckle with the learning moment.

While some puns listed may be a little subtle, guidance from teachers will enable students to appreciate the humor and its connection to the science. To highlight this link, brief explanations of the chemical relevance are provided to assist teachers identify where each might be used most effectively in a chemistry or physical science course. Some suggestions for classroom activities are also provided.



The puns are divided into general chemical topics such as acids and bases, salts, chemical nomenclature, states of matter, density, etc. This is merely a guide since puns could be used at different curriculum stages, grade levels, and even in other subjects such as biology or Earth sciences. For example, the sodium chloride pun could be used when introducing acid/base, nomenclature, or bonding concepts.

A common feature employed with these puns is to provide a chemical anthropomorphism approach by inserting the chemical substance into a familiar setting that students can identify with, as if the substance was a living entity consciously interacting with its environment, to highlight the humor factor. However, real science can still be communicated to students through the humor, so teachers could use them to break the ice when introducing new topics through lectures, labs, or demonstrations.

Acids and bases

Hydrochloric acid accidentally bumped into ammonia on the street and started fuming.

Generally, mixing acids and bases produces no visible physical change to indicate a chemical reaction has taken place. An obvious exception would be the evolution of carbon dioxide gas when

the base is a carbonate or bicarbonate. Another is the combination of vapors when opened bottles of concentrated hydrochloric acid and aqueous ammonia (ammonium hydroxide) solutions are brought together producing a "smoke" of ammonium chloride particles. This simple and fun demonstration can be safely performed at the front of the classroom while the teacher explains how molecules of HCl and NH_3 "fume" with annoyance when they unexpectedly bump into each other.

Hydrofluoric acid went to the art gallery with a briefcase full of etchings.

Unlike most acids, hydrofluoric acid (HF) cannot be stored in glass bottles since it reacts with glass, etching (or frosting) it. If teachers have access to small quantities of HF, an etching demonstration can be performed at a distance from students. The chemical pun then obviously links the unusual HF reaction with glass to an artist's etchings.

Thymolphthalein indicated it wasn't reliable because after a period of high visibility it suddenly disappears.

Chemical indicators are commonly used in science classrooms, litmus paper being familiar to many students. Phenolphthalein is also widely used as an indicator in acid/base titrations or to test for basic solutions (turns bright pink in base; colorless in acid). Thymolphthalein is less known but reacts similarly to phenolphthalein turning a deep blue in base. Using a paintbrush, dilute solutions of thymolphthalein in ethanol containing a little base can be painted on sheets of paper to reveal blue strokes. If the paper is gently waved in the air, or just allowed to sit for a few minutes, the solvent evaporates and the blue lines vanish. (While phenolphthalein behaves similarly, thymolphthalein's blue color looks like common blue ink). This is a fun demonstration for teachers to show and explain that acidic carbon dioxide in the air turns the indicator back to its colorless form and so, after a period of high visibility, thymolphthalein vanishes.

Bismuth subsalicylate finally arrived at the banquet, much to everyone's relief.

Pepto-Bismol is a familiar over-the-counter medication for temporary relief of stomach and gastrointestinal tract complaints. The active ingredient is bismuth subsalicylate, a weak base and therefore the product has a mild antacid effect to treat heartburn. Clearly, after overeating at a banquet, diners would welcome a dose of this product to relieve their upset stomach symptoms. While this pun could be used during a discussion of acids and bases, it could also be introduced when discussing solutions which, depending on the class level, may also include references to colloids. Bismuth subsalicylate has a very low solubility, less than 1 mg per ml of water, with tiny particles suspended in the pink colloidal mixture. Bismuth subsalicylate is also a white crystalline solid, so the familiar pink medication has artificial color added.

Chemical nomenclature

Sodium bicarbonate helped with the fundraising since it can raise dough.

A common base found in kitchens, sodium bicarbonate (baking soda) is used as a leavening agent in doughs and batters since it reacts with food acids to produce gas bubbles of carbon dioxide that lighten cakes and breads as they rise on baking. Students can easily and safely perform this reaction in class with a weak acid (e.g., vinegar) while the teacher explains that the sodium bicarbonate "raises dough." As an additional piece of chemical trivia, teachers at upper levels can explain that the bicarbonate name still used today originates from an older naming system. The use of *bi*, meaning two, was derived from the fact the ratio of sodium to carbonate in sodium bicarbonate ($NaHCO_3$) is 1:1 whereas it's 2:1 in sodium carbonate (Na_2CO_3). In other words, there is twice as much carbonate as sodium in $NaHCO_3$ compared to Na_2CO_3. Sodium hydrogen carbonate is therefore the better name to use for $NaHCO_3$.

Sodium hydroxide was blocked on Twitter to prevent the spread of lyes.

Common terms for well-known chemical substances are still widely used, such as baking soda mentioned above. But others have fallen into disuse. Such a word is lye, the ancient term for alkaline substances leached from wood ashes, and today generally refers to the strong bases sodium or potassium hydroxide. In 2020, Twitter began tagging what it deemed misleading content by posters that may or may not be actual outright lies. This pun therefore connects a popular social media site with the homonyms lie and lye.

Ferric oxide likes the family dog Rusty.

When teaching how to name simple ionic compounds containing a metal that can have different oxidation states, Roman numerals are used, e.g., iron (III) oxide. An older nomenclature system uses the suffixes *-ic* and *-ous* to distinguish metal oxidation states. Students need to be aware of these alternatives since they are still sometimes used (e.g., ferric oxide) in textbooks and on the internet. Since rust is a hydrated form of ferric oxide, if this compound had a pet dog, wouldn't it be (named) Rusty?

Iron pyrite pretended to be wealthy, but didn't fool anyone.

As any gold miner knows, beware of iron pyrite. Its golden metallic appearance has fooled many a prospector of the precious metal. In fact, the mineral is well-known as fool's gold although it is more correctly identified as an iron sulfide assigned the formula FeS_2. The mineral can form large cubic-shaped gold-colored crystals, and samples should be shown to students to illustrate the beauty of the natural mineral world.

States of matter: Liquids and gases

Liquid nitrogen tried to make a new friend but got a chilly reception.

Nitrogen gas liquefies at around –196°C and may be mentioned when discussing states of matter. The "chilly reception" will be a clear pun based on its low temperature. Although liquid nitrogen is expensive and requires a specially insulated vessel to transport, liquid nitrogen's rapid cooling effect makes fascinating demonstrations (e.g., instance freezing of fruit such as grapes, or collapsing an inflated party balloon). The author has found local gas supply companies will sometimes donate small quantities of liquid nitrogen to schools for demonstration purposes, so it is worth inquiring with a local supplier before purchasing. Students should not be allowed to handle liquid nitrogen and the teacher should demonstrate from a safe distance.

Butane walks into a room and the crowd lights up every time.

Butane gas can be easily liquified and stored under pressure for use as a portable fuel in gas cylinders used in barbecues and camping stoves (also cigarette lighters, but teachers may consider this inappropriate to mention). Highly flammable, butane would definitely "light up" a room if ignited.

Nitrous oxide was invited to a party and soon had everyone chuckling.

Also known as laughing gas, nitrous oxide is used by some dentists due to its sedative properties. Contrary to its depiction in movies as causing fits of hysterical laugher when inhaled, it can also produce mild euphoria or hallucination and was once popular in the U.K. around 1800 at "laughing gas parties." Nevertheless, the widely known common name works well for this chemical pun.

Argon was strongly attracted to nitrogen, but recognized its behavior wasn't ideal.

Argon and nitrogen are both gases found in the Earth's atmosphere, with argon being the third-most abundant. Both are chemically unreactive elements, especially argon, so they would not be expected to combine to form compounds—such chemical behavior would not be "ideal" for these inert gaseous elements. However, the term "ideal gas" has a broader definition that is usually explained with gas law theory which will be apparent to students in upper-level chemistry classes.

Environmental chemistry

Trichlorofluoromethane was labeled a radical initiator in the current climate.

This compound was one of many chlorofluorocarbon gases (CFCs) once widely used as refrigerants and as propellants in aerosol spray cans, but has since been replaced by more environmentally friendly compounds (e.g., butane) that do not destroy the protective ozone layer in the Earth's stratosphere. The mechanism of CFCs reaction with ozone involves forming free radicals—highly reactive atoms or molecules containing an unpaired electron—that can break down the ozone. Radical is also a popular term applied to individuals intent on bringing about significant social changes, often seen by some as extreme, as witnessed through many public demonstrations in 2020. So this pun fits the context of radicals in the "current climate" both chemically and politically.

Salts

Sodium chloride was horrified after witnessing salted peanuts being devoured at the meeting.

While the general term *salt* is used in chemistry for ionic compounds formed from an acid reacting with a base, it is also the well-known common name for sodium chloride (NaCl) or ordinary table salt. Were crystals of NaCl sentient beings, one could imagine their horror at witnessing others of their kind being devoured on human food.

Barium sulfate walked into a restaurant but was informed they didn't serve barium meals.

Barium sulfate is a contrast agent ingested before radiological procedures (e.g., x-rays) to aid diagnosis of gastrointestinal problems. Despite barium compounds being highly toxic, the extremely low solubility of barium sulfate means none of the barium will be absorbed by the patient. Although some people refer to the suspension of the barium sulfate in a flavored solution as the "barium meal," the term technically applies to the medical procedure that examines the lower esophagus, stomach, and duodenum. Nevertheless, connecting the term to a restaurant makes the pun valid.

Copper sulfate needed comforting because it was feeling rather blue.

Most students will recognize that salts of transition metals are often colored, blue or blue/green being common for copper compounds. So this simple pun should be obvious to a class, especially after a lab or demonstration using a compound such as copper (II) sulfate.

Density

Osmium lost the trivia contest with other metals because it was too dense.

The density of metals varies enormously: from 0.534 g/cm^3 for lithium to 22.6 g/cm^3 for osmium. If teachers have access to samples of metals of equal volume (many scientific supply companies sell these), they make an excellent demonstration when introducing the density concept (students should be provided with gloves if allowed to handle and share the samples). Osmium, however, is too expensive and toxic to be used in a classroom. Nevertheless, it's a good example to illustrate that many of the little-known metals in the periodic table do have important uses—osmium is used to make alloys such as osmiridium. After explaining that osmium has the highest density of any metal, students can be asked which metal would lose a trivia contest amongst all the metallic elements and the dense pun will be appreciated. Of course, other more familiar metals such as lead could be used instead of osmium.

Chemical bonding

Tungsten carbide was seen hanging around outside a London restroom.

The chemical formula for tungsten carbide is WC since the oxidation state of the elements are +4 and -4, respectively, although it is not composed of simple ions in the traditional ionic bonding sense. While less used in the U.S., the term WC is commonly used in the U.K. as an abbreviation for a restroom (Water Closet). Although actual signs stating Water Closet do not usually hang outside British public restrooms, this pun will be apparent with a little explanation. And let's face it, despite being a rather subtle pun, students do enjoy bathroom humor.

Silicon dioxide's favorite British pop singer from the 60s is Sandie Shaw.

While students will be unfamiliar with most entertainers from past decades, British pop singer Sandie Shaw had several big hits in the U.S. in the 1960s (e.g., "Puppet on a String.") Nevertheless, her name will amusingly conjure up images of beaches. Silicon dioxide, the main component of beach sand, can be used to remind students that it is permissible to use prefixes for numbers (e.g., *di-*) when naming covalent compounds. Prefixes are considered redundant when naming ionic compounds, so they are not used.

Everyday organic compounds

Sucrose is always popular because it's just as sweet as can be.

Because of their wide use in household products, many familiar chemical substances can be used to illustrate organic compounds. Sucrose, a disaccharide composed of glucose and fructose, is more commonly known as ordinary table sugar so the pun here will be obvious.

Teflon attempted to teach a class of students, but nothing would stick.

Better known to chemists as polytetrafluoroethylene, Teflon was first used in nonstick cookware in the 1960s, so the "nothing would stick" pun works well here.

Indigo saw a pair of old faded jeans and wanted to just dye.

Another homonym pun, this time based on the dye/die pair. Originally extracted from a plant in Asia, natural indigo's deep blue color was used to dye denim cloth used to manufacture jeans. Today, denim clothing is dyed with synthetic indigo. Although faded jeans have long been popular with kids, one might expect indigo just "wanted to dye" when it saw a faded pair.

Urea is always complaining it's going to waste.

In the process of digestion in mammals, food is broken down and unused nitrogen must be eliminated from the body. The nitrogen is converted to urea and this is eliminated through the urine, giving rise to the pun about urea going to waste. This could also be used in a biology or nutrition class. Urea has a very high solubility, more than 1,000 grams per liter of water at 20°C, making it an ideal chemical to remove waste. ■

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