Co- curricular Activity for Class 12

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History of Chemistry 

Chemistry is a branch of science that has been around for a long time. In fact, chemistry is known to date back to as far as the prehistoric times. Due to the amount of time chemistry takes up on the timeline, the science is split into four general chronological categories. The four categories are: prehistoric times - beginning of the Christian era (black magic), beginning of the Christian era - end of 17th century (alchemy), end of 17th century - mid 19th century (traditional chemistry) and mid 19th century - present (modern chemistry).

Time Intervals	Specific Times	Events	Description
Prehistoric Times - Beginning of the Christian Era (Black Magic) http://tqd.advanced.org/2690/hist/black.html	1700 BC	King Hammurabi's reign over Babylon	Known metals were recorded and listed in conjunction with heavenly bodies.
	430 BC	Democritus of ancient Greece	Democritus proclaims the atom to be the simplest unit of matter. All matter was composed of atoms.
	300 BC	Aristotle of ancient Greece	Aristotle declares the existence of only four elements: fire, air, water and earth. All matter is made up of these four elements and matter had four properties: hot, cold, dry and wet.
Beginning of the Christian Era - End of 17th Century (Alchemy) http://tqd.advanced.org/2690/hist/alchemy.html	300 BC - 300 AD	The Advent of the Alchemists	Influenced greatly by Aristotle's ideas, alchemists attempted to transmute cheap metals to gold. The substance used for this conversion was called the *Philosopher's Stone*.
	13th Century (1200's) - 15th Century (1400's)	Failure of the Gold Business	Although Pope John XXII issued an edict against gold-making, the gold business continued. Despite the alchemists' efforts, transmutation of cheap metals to gold never happened within this time period.
	1520	Elixir of Life	Alchemists not only wanted to convert metals to gold, but they also wanted to find a chemical concoction that would enable people to live longer and cure all ailments. This elixir of life never happened either.
	End of 17th Century	Death of Alchemy	The disproving of Aristotle's four-elements theory and the publishing of the book, *The Skeptical Chemist* (by Robert Boyle), combined to destroy this early form of chemistry.
	1700's		Johann J. Beecher believed in a substance called phlogiston.

End of 17th Century - Mid 19th Century (Traditional Chemistry) http://tqd.advanced.org/2690/hist/traditional.html		Phlogiston Theory Coulomb's Law	When a substance is burned, phlogiston was supposedly added from the air to the flame of the burning object. In some substances, a product is produced. For example, calx of mercury plus phlogiston gives the product of mercury. Charles Coulomb discovered that given two particles separated by a certain distance, the force of attraction or repulsion is directly proportional to the product of the two charges and is inversely proportional to the distance between the two charges.
	1774-1794	Disproving of the Phlogiston Theory	Joseph Priestley heated calx of mercury, collected the colorless gas and burned different substances in this colorless gas. Priestley called the gas "dephlogisticated air", but it was actually oxygen. It was Antoine Lavoisier who disproved the Phlogiston Theory. He renamed the "dephlogisticated air" oxygen when he realized that the oxygen was the part of air that combines with substances as they burn. Because of Lavoisier's work, Lavoisier is now called the "Father of Modern Chemistry".
	1803	Dalton's Atomic Theory	John Dalton publishes his Atomic Theory which states that all matter is composed of atoms, which are small and indivisible.
Mid 19th Century - Present (Modern Chemistry *or* 20th Century Chemistry) http://tqd.advanced.org/2690/hist/modern.html	1854	Vacuum Tube	Heinrich Geissler creates the first vacuum tube.
	1879	Cathode Rays	William Crookes made headway in modern atomic theory when he used the vacuum tube made by Heinrich Geissler to discover cathode rays. Crookes created a glass vacuum tube which had a zinc sulfide coating on the inside of one end, a metal cathode imbedded in the other end and a metal anode in the shape of a cross in the middle of the tube. When electricity was run through the apparatus, an image of the cross appeared and the zinc sulfide glowed. Crookes hypothesized that there must have been rays coming from the cathode which caused the zinc sulfide to fluoresce and the cross to create a shadow and these rays were called cathode rays.
	1885	The Proton	Eugene Goldstein discovered positive particles by using a tube filled with hydrogen gas (this tube was similar to Thomson's tube...see 1897). The positive particle had a charge equal and opposite to the electron. It also had a mass of 1.66E-24 grams or one atomic mass unit. The positive particle was named the proton.
	1895	X-rays	Wilhelm Roentgen accidentally discovered x-rays while researching the glow produced by cathode rays. Roentgen performed his research on cathode rays within a dark room and during his research, he noticed that a bottle of barium platinocyanide was glowing on a shelf. He discovered that the rays that were causing the fluorescence could also pass through glass, cardboard and walls. The rays were called x-rays.

	1896	Pitchblend	Henri Becquerel was studying the fluorescence of pitchblend when he discovered a property of the pitchblend compound. Pitchblend gave a fluorescent light with or without the aid of sunlight.
	1897	The Electron and Its Properties Radioactive Elements	J.J. Thomson placed the Crookes' tube within a magnetic field. He found that the cathode rays were negatively charged and that each charge had a mass ratio of 1.759E8 coulombs per gram. He concluded that all atoms have this negative charge (through more experiments) and he renamed the cathode rays electrons. His model of the atom showed a sphere of positively charged material with negative electrons stuck in it. Thomson received the 1906 Nobel Prize in physics. Marie Curie discovered uranium and thorium within pitchblend. She then continued to discover two previously unknown elements: radium and polonium. These two new elements were also found in pitchblend. She received two nobel prizes for her discovery; one was in chemistry while the other was in physics.
	1909	Mass of the Electron	Robert Millikan discovered the mass of an electron by introducing charged oil droplets into an electrically charged field. The charge of the electron was found to be 1.602E-19 coulombs. Using Thomson's mass ration, Millikan found the mass of one electron to be 9.11E-28 grams. Millikan received the 1932 Nobel Prize in Physics for this discovery.
	1911	Three Types of Radioactivity	Ernest Rutherford sent a radioactive source through a magnetic field. Some of the radioactivity was deflected to the positive plate; some of it was deflected to the negative plate; and the rest went through the magnetic field without deflection. Thus, there were three types of radioactivity: alpha particles (+), beta particles (-) and gamma rays (neutral). By performing other experiments and using this information, Rutherford created an atomic model different from Thomson's. Rutherford believed that the atom was mostly empty space. It contains an extremely tiny, dense positively charged nucleus (full of protons) and the nucleus is surrounded by electrons traveling at extremely high speeds. The Thomson model was thrown out after the introduction of the Rutherford model.
	1914	Protons within a Nucleus	Henry Moseley attempts to use x-rays to determine the number of protons in the nucleus of each atom. He was unsuccessful because the neutron had not been discovered yet.
	1932	The Neutron Neutron Bombardment and Nuclear Fission	James Chadwick discovers the neutron. Enrico Fermi bombards elements with neutrons and produces elements of the next highest atomic number. Nuclear fission occurred when Fermi bombarded uranium with neutrons. He received the 1938 Nobel Prize in physics.
	1934	Artificial Radioactive Elements	Irene Curie and Frederic Joliot-Curie discovered that radioactive elements could be created artificially in the lab with the bombardment of alpha particles on certain elements. They were

			given the 1935 Nobel Prize.
	1940's	Manhattan Project	Albert Einstein and Enrico Fermi both warned the United States about Germany's extensive research on atomic fission reaction. Below the football field at the University of Chicago, the United States developed the very first working nuclear fission reactor. The Manhattan Project was in process.

Each link for each time interval contains some information about that period. Unfortunately, the information is sparse and the presentation of the info leaves much to be desired. However, more information on chemical history can be found in the links listed below. The list is collated in a chronological manner so like the table above, alchemy and black magic should be on top while traditional and modern chemistry should be closer to the end of the list. Also, there are some other links besides the ones that are in the time-interval section and these links should lead you to more information about the underlined topics.

Additional History Links

1. Alchemy - this link provides an insight into the science that was said to precede chemistry. It gives a brief, colorful history of alchemy itself and a few stories about the people who actually practiced the science.

2. More Alchemy....a lot more - a whole website dedicated to the predecessor of chemistry. This site contains unlimited information about alchemy. If you have questions about alchemy, this is definitely the place to go!

3. THE History of Chemistry - a great cache of chemical history is contained at this Umea University Chemistry Department site. Biographies of famous scientists, collection of science papers and etc. are found and well-catalogued in this area.

4. The Week in Chemical History - this site makes a connection between the current week and an important episode in the past that had a great impact on the world of chemistry

5. Chemistry Papers - this site not only provides a great amount of papers on certain chemistry theories, but it also contains many papers written on topics in the other sciences. In fact, the papers are collected and collated by their scientific topics (chemistry, physics, biology)

6. African American Scientists - contains a list of African American scientists who have made a difference in each of their respective sciences.

7. Chemical History by Chemistry topics - this site collates its information by the chemistry topic that the information pertains to.

8. Elements' Histories - the histories of most of the elements on the periodic table.

9. History of the Periodic Table - a brief summary of the periodic table's past.

10. Another Periodic Table - yet another site with the histories of the elements on the periodic table.

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