Consequences Of Knowledge And Development Of The Atom

Negative: Nuclear fission, nuclear fusion and the atomic bomb

The atomic bomb is a powerful weapon, which has only been used twice in war, both times during World War Two by the US against Japan. These bombs were created using nuclear fission and nuclear fusion. Nuclear fission is when an atom of radioactive material splits into lighter atoms, releasing a sudden burst of powerful energy. Nuclear fusion is when two lighter atoms of a radioactive material combine and release a sudden burst of energy. The idea for atomic bomb was created by Otto Hahn, Lise Meitner and Fritz Strassman, Nuclear Physicists in a lab in Berlin, Germany in 1938. In 1942, Franklin D. Roosevelt authorized type formation of the Manhattan Project. The Manhattan Project was a project started to develop a functioning atomic bomb in response to fears that Germany was working on nuclear technology. The project took place in in Los Alamos, New Mexico. On July 16, 1945 the first Atomic Bomb was dropped in Alamogordo, New Mexico. This was called the Trinity Test. On August 6, 1945, during the Second World War, the first Atomic bomb was dropped on Hiroshima. The bomb levelled 5 square miles of the city and killed 80,000 people instantly. Tens of thousands of people died of radiation exposure later. 3 days later, on August 9, the second bomb was dropped, this time on Nagasaki. 40,000 people died instantly, and Japan surrendered 6 days later, on August 19, bringing World War Two to an end. 4 years later, in 1949, the soviets tested five nuclear bombs, beginning the arms race between the USSR and USA, where both sides rushed to test and research to get as many powerful nuclear bombs as they could.

Positive: New fields of science

The advancing and developing of knowledge of atoms has created new fields of science, such as:

Atomic Physics:

“The branch of physics concerned with the structure of the atom and the characteristics of subatomic particles”

Chemistry:

“The branch of science concerned with the substances of which matter is composed, the investigation of their properties and reactions, and the use of such reactions to form new substances”

Nuclear Physics:

“The physics of atomic nuclei and their interactions, especially in the generation of nuclear energy”

Quantum Mechanics:

“The branch of mechanics that deals with the mathematical description of the motion and interaction of subatomic particles, incorporating the concepts of quantization of energy, wave–particle duality, the uncertainty principle, and the correspondence principle”

Atomic Timeline:

- Max Planck: Created a new field of science, quantum mechanics 1900
- Crooks: Discovered negative charge in atoms 1832
- Aristotle & other Greeks Said that everything is made up of the elements (fire, water, earth and air). 450 BC
- Geiger Created the plum pudding model 1910
- The Curies Created a new field of science, atomic physics 1896
- Erwin Schrödinger Created the electron cloud model 1926
- John Dalton Said that everything is made of atoms 1803
- Murray Gell-Mann & George Zweig Discovered Quarks 1964
- Chadwick Discovered Neutrons 1932
- Otto Hahn and Lise Meitner Discovered nuclear fission 1938
- Ernest Rutherford Created the planetary model 1911
- Coulomb Created Coulomb’s law 1785
- Lavoisier Discovered that mass is stored in a chemical reaction 1796

Atomic Models:

1. Solid Sphere Model: Created by: John Dalton Created in: 1803
2. Plum Pudding Model: Created by: J. J. Thomson Created in: 1904
3. Rutherford’s Nuclear Model: Created by: Ernest Rutherford Created in: 1911
4. Planetary Model: Created by: Neils Bohr Created in: 1913
5. Electron Cloud Model: Created by: Erwin Schrödinger Created in: 1926

Bibliography

1. Study.com. (2020). [online] Available at: https://study.com/academy/lesson/max-planck-atomic-theory-discovery-of-light.html [Accessed 1 Mar. 2020].
2. Encyclopedia Britannica. (2020). Sir William Crookes | chemist. [online] Available at: https://www.britannica.com/biography/William-Crookes [Accessed 2 Mar. 2020].
3. Sites.google.com. (2020). Sir William Crookes' - The Atomic Structure 1861-1880. [online] Available at: https://sites.google.com/site/theatomicstructure18611880/sir-william-crookes/sir-william-crookes [Accessed 2 Mar. 2020].
4. Sutori.com. (2020). Sutori. [online] Available at: https://www.sutori.com/item/aristotle-s-views-on-atoms-450-b-c-aristotle-did-not-believe-in-the-atomic-theory [Accessed 2 Mar. 2020].
5. En.m.wikipedia.org. (2020). Geiger–Marsden experiment. [online] Available at: https://en.m.wikipedia.org/wiki/Geiger–Marsden_experiment [Accessed 2 Mar. 2020].
6. Atomic Heritage Foundation. (2020). Marie Curie. [online] Available at: https://www.atomicheritage.org/profile/marie-curie [Accessed 2 Mar. 2020].
7. Abcte.org. (2020). Development of the Atomic Theory. [online] Available at:

http://www.abcte.org/files/previews/chemistry/s1_p6.html [Accessed 2 Mar. 2020].
8. courses.lumenlearning.com. (2020). John Dalton and Atomic Theory | Introduction to Chemistry. [online] Available at: https://courses.lumenlearning.com/introchem/chapter/john-dalton-and-atomic-theory/ [Accessed 2 Mar. 2020].
9. NobelPrize.org. (2020). The Nobel Prize in Physics 1922. [online] Available at: https://www.nobelprize.org/prizes/physics/1922/bohr/facts/ [Accessed 2 Mar. 2020].
10. theory?, H. (2020). How did James Chadwick contribute to the atomic theory? | Socratic. [online] Socratic.org. Available at: https://socratic.org/questions/how-did-james-chadwick-contribute-to-the-atomic-theory [Accessed 2 Mar. 2020].
11. Particleadventure.org. (2020). Modern Particle Theory timeline. [online] Available at: https://particleadventure.org/other/history/smt.html [Accessed 3 Mar. 2020].
12. Allain, R., Allain, R., Simon, M., Davies, A., Harrison, S., Wolchover, N., Stirone, S. and Friedler, D. (2020). The development of the atomic model. [online] WIRED. Available at: https://www.wired.com/2009/09/the-development-of-the-atomic-model/ [Accessed 3 Mar. 2020].
13. Studios, A. (2020). Chem4Kids.com: Atoms. [online] Chem4kids.com. Available at: http://www.chem4kids.com/files/atom_intro.html [Accessed 3 Mar. 2020].
14. Sites.google.com. (2020). Atoms in everyday life - The Atom. [online] Available at: https://sites.google.com/site/theatomcom/atoms-in-everyday-life [Accessed 3 Mar. 2020].
15. Courses.lumenlearning.com. (2020). History of Atomic Structure | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/history-of-atomic-structure/ [Accessed 3 Mar. 2020].
16. Encyclopedia Britannica. (2020). Atom - Development of atomic theory. [online] Available at: https://www.britannica.com/science/atom/Development-of-atomic-theory [Accessed 3 Mar. 2020].
17. Studios, A. (2020). Chem4Kids.com: Atoms. [online] Chem4kids.com. Available at: http://www.chem4kids.com/files/atom_intro.html [Accessed 3 Mar. 2020].
18. Encyclopedia Britannica. (2020). Atom - The beginnings of modern atomic theory. [online] Available at: https://www.britannica.com/science/atom/The-beginnings-of-modern-atomic-theory [Accessed 3 Mar. 2020].
19. Courses.lumenlearning.com. (2020). Discoveries Leading to Nuclear Atom Model | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/discoveries-leading-to-nuclear-atom-model/ [Accessed 3 Mar. 2020].
20. Courses.lumenlearning.com. (2020). The Structure of the Atom | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/the-structure-of-the-atom/ [Accessed 3 Mar. 2020].
21. Courses.lumenlearning.com. (2020). The Periodic Table | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/the-periodic-table/ [Accessed 3 Mar. 2020].
22. Courses.lumenlearning.com. (2020). Types of Chemical Bonds | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/types-of-chemical-bonds/ [Accessed 3 Mar. 2020].
23. Courses.lumenlearning.com. (2020). Types of Chemical Bonds | Boundless Chemistry. [online] Available at: https://courses.lumenlearning.com/boundless-chemistry/chapter/types-of-chemical-bonds/ [Accessed 3 Mar. 2020].
24. En.m.wikipedia.org. (2020). Atomic physics. [online] Available at:

https://en.m.wikipedia.org/wiki/Atomic_physics [Accessed 3 Mar. 2020]
25. En.m.wikipedia.org. (2020). Atomic physics. [online] Available at: https://en.m.wikipedia.org/wiki/Atomic_physics [Accessed 3 Mar. 2020].