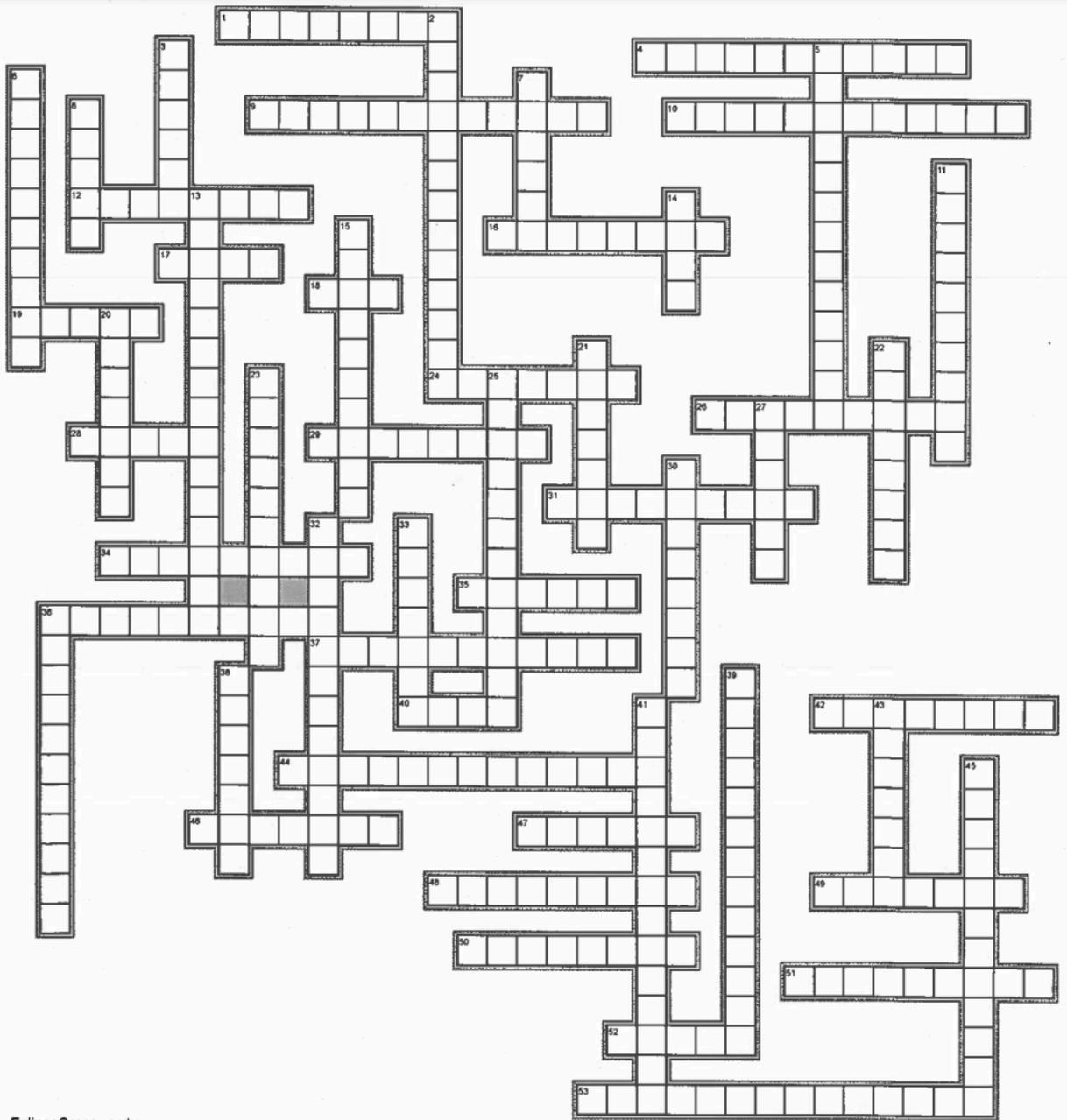


Nobel Prizes 1951-1960

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Word bank

ALPHA ANTIMATTER ANTIPARTICLE BECQUEREL BETA CAPTURE CARBON
CHEMOTHERAPY CHROMATOGRAPHY CITRIC COORDINATION DAUGHTER ELECTROMAGNETIC
ELECTRON VOLT FISSION FRANCIUM FUSION GAMMA GEIGER GRAVITY GRAY HALF
INSULIN ISOTOPES LANGERHANS MACROMOLECULAR MAGIC MAGNETIC MASS DEFECT
MCMILLAN MECHANISMS MILLICURIE MODERATOR NEPTUNIUM NUCLEIC NUCLEOTIDES
PAULING PLANT POLAROGRAPHIC POLAROGRAPHY POSITRON RADIATION RADIOCARBON
RESONANCE RNA ROENTGEN SANTIAGO SCINTILLATION SIEVERT STATIONARY STRONG
SULFIDE TRANSMUTATION TUBERCULOSIS

Across

- The percent abundance of the 3 _____ of carbon C-12, C-13 and C-14 are 98.89%, 1.11% and $2 \times 10^{-10}\%$.
- The 1957 Nobel Prize in chemistry was awarded to Alexander Todd for his work in understanding the structure and function of _____.
- Pauling's Rules were developed to help understand crystal structures and to predict _____ numbers.
- _____ to the electron; it has identical properties to an electron, except for having the opposite (positive) charge
- The 1952 Nobel Prize in Physics was awarded to Felix Bloch and Edward Purcell for precision nuclear _____ measurements.
- Edwin _____ was awarded the 1951 Nobel Prize in chemistry. His team accelerated neutrons to radiate uranium (92 protons) and create an artificial element (not in earths crust) with an atomic number of 93.
- C-14 undergoes radioactive decay and produces N-14 and a _____ particle.
- The building blocks of DNA and _____ are composed of nucleotides
- _____ number ; nuclei with specific numbers of nucleons that are within the band of stability. The 7 most recognized magic numbers (# protons) are 2, 8, 20, 28, 50, 82, and 126.
- A macromolecule is a large molecule of biological chemistry. Example; protein or _____ acid.
- The 1952 Nobel Prize work laid the foundation for a common technique used in chemistry called nuclear magnetic _____ or NMR.
- high-energy helium nucleus; a helium atom that has lost two electrons and contains two protons and two neutrons
- _____ nuclide. Nuclide produced by the radioactive decay of another nuclide; may be stable or may decay further
- nuclear _____ : substance that slows neutrons to a speed low enough to cause fission
- Element 93 is a transuranium actinide that was first created in an artificial nuclear reaction. Its symbol is Np and it is called _____
- _____ counter ; instrument that detects and measures radiation via the ionization produced in a Geiger-Müller tube
- _____ (mCi). larger unit for rate of radioactive decay frequently used in medicine; $1 \text{ Ci} = 3.7 \times 10^{10}$ disintegrations/s
- highly accurate means of dating objects 30,000–50,000 years old that were derived from once-living matter; achieved by calculating the ratio of $^{14}\text{C}:^{12}\text{C}$ in the object vs. the ratio of $^{14}\text{C}:^{12}\text{C}$ in the present-day atmosphere
- _____ (Gy) SI unit for measuring radiation dose; $1 \text{ Gy} = 1 \text{ J absorbed/kg tissue}$
- conversion of a proton into a neutron, which remains in the nucleus, and a _____, which is emitted
- The 1959 Nobel Prize in Chemistry went to Jaroslav Heyrovsky. He discovered _____ methods of analysis.
- The weakest of the 4 forces is?

47. The 1960 Nobel Prize in Chemistry was awarded to Willard Libby for the development of a method that used _____-14 dating for age determination in subjects such as archaeology and geology.
48. _____ absorbed dose (rad) SI unit for measuring radiation dose, frequently used in medical applications; 1 rad = 0.01 Gy
49. (Sv) SI unit measuring tissue damage caused by radiation; takes into account energy and biological effects of radiation
50. _____ equivalent man (rem). Unit for radiation damage, frequently used in medicine; 100 rem = 1 Sv
51. _____(Bq). SI unit for rate of radioactive decay; 1 Bq = 1 disintegration/s
52. The half-life of C-14 is approximately 5730 years, which means the oldest objects that can be dated with this technique are approximately 50,000 years old. Common items dated with this technique are dead _____(wood) or animal (bones) matter.
53. The 1952 Nobel Prize in Chemistry as awarded jointly to Archer John Martin and Richard Synge for their discovery of partition _____ .

Down

2. _____ counter instrument that uses a scintillator—a material that emits light when excited by ionizing radiation—to detect and measure radiation
3. Nuclear -_____ is when 2 nuclei collide to form a heavier nucleus, often releasing large amounts of energy. $E = mc^2!!$
5. Nuclear _____, conversion of one nuclide into another nuclide
6. The 1956 Nobel Prize in Chemistry was awarded to Cyril Hinshelwood and Nikolay Semenov for their innovative work understanding _____ of chemical reactions.
7. The 1953 Nobel Prize in Physiology or Medicine was awarded to Hans Krebs. He discovered the _____ acid cycle.
8. _____ ray (? or 00?) short wavelength, high-energy electromagnetic radiation that exhibits wave-particle duality
11. Particles with the same mass but opposite properties (such as charge) of ordinary particles.
13. A photon is a packet of _____ radiation
14. _____-life ($t_{1/2}$). time required for half of the atoms in a radioactive sample to decay
15. Insulin a hormone synthesized in the pancreas by the Islets of _____. These islets control how much glucose is produced and distributed in the blood. An absence of insulin can result in one type of diabetes.
20. The 1958 Nobel Prize in Chemistry 1958 went to Frederick Sanger. He did pioneering work in discovering protein structures, with an emphasis on _____.
21. splitting of a heavier nucleus into two or more lighter nuclei, usually accompanied by the conversion of mass into large amounts of energy
22. Ernest Hemingway won the 1954 Nobel Prize in literature for his literary work, specifically for his classic *The Old Man and the Sea*. The three main characters are _____ (the old man), Manolin (a young man), and the giant marlin whom the old man battles in the open ocean.
23. In partition chromatography the _____ phase is a liquid film on a solid material, typically 3–15 micrometer silica particles. The small particles provide a large surface area.
25. Similar to internal radiation therapy, but chemical rather than radioactive substances are introduced into the body to kill cancer cells.
27. The most powerful of the 4 forces is the _____force? Gravitation, electromagnetism, the _____ and the weak nuclear force are the four nuclear forces.
30. Pauling's electronegativity scale starts with Fluorine (F; most electronegative = 4.0) to _____ (Fr: least electronegative = 0.6).
32. The 1952 Nobel Prize in Medicine was awarded to Selman Waksman. He discovered streptomycin, and showed it was effective against _____, which is caused by the bacterium *Mycobacterium tuberculosis*. Currently there are approximately two billion people on the planet that have some form of Tb.
33. The 1954 Nobel Prize in Chemistry went to Linus _____ for his work in describing the chemical bond, which also shaped our understanding of molecular geometries.

36. _____ is the difference between the mass of an atom and the summed mass of its constituent subatomic particles (or the mass "lost" when nucleons are brought together to form a nucleus)
38. electron _____ is the combination of a core electron with a proton to yield a neutron within the nucleus.
39. measurement unit of nuclear binding energies, with 1 eV equaling the amount of energy due to the moving of an electron across an electric potential difference of 1 volt. What is eV?
41. The 1953 Nobel Prize in Chemistry was awarded to Hermann Staudinger for his work in _____ chemistry.
43. The 1955 Nobel Prize in Chemistry was awarded to Vincent du Vigneaud. He worked with biochemically relevant sulphur compounds. S^{2-} is called _____
45. _____ is a physical/analytical technique where an atom or molecule undergo oxidation (lose electrons) or reduction (gain electrons). It takes place on the surface of a drop of mercury and involves an electrical voltage (potential). The Hg drops every few seconds generating a new/clean surface. (LEO = lose electrons oxidation / GER gain electrons reduction).