100 Ways to PASS the Chemistry Regents!

Way	Topic	Main Concept	Explanation	Video Length (min:sec)
1	Safety	Safety in the lab	Read questions carefully; Use common sense.	1:33
2	Matter	Matter	a substance (element or compound) or mixture of substances (aq)	2:44
3	Matter	Conservation of Matter	Matter can not be created or destroyed; it can only change forms; includes mass, charge, & energy	0:45
4	Matter	chemical property	reacts with, combines with to produce something new	1:56
5	Matter	can *not* be broken down (decomposed)	elements, Table S	2:12
6	Matter	distillation	uses boiling point differences to separate substances	1:15
7	Matter	allotropes (O2, O3; diamond, graphite)	2 forms of the same element in the same phase: different structures, different properties	1:35
8	Gas, Liquid, Solid	Kinetic Molecular Theory	how particles behave: random, constant, straight-line motion; have negligible volume	1:46
9	Gas, Liquid, Solid	Ideal gas	High temperature, Low Pressure	1:14
10	Gas, Liquid, Solid	entropy	disorder; s → l → g (entropy increases)	2:20
11	Gas, Liquid, Solid	Avogadro's Hypothesis	2 different gases, at the same temperature, pressure & volume will have the same number of atoms/molecules	2:09
12	Gas, Liquid, Solid	Vapor Pressure	Table H	1:27
13	Heat	temperature	average kinetic energy	1:38
14	Heat	heat flow	high temperature to low temperature	2:44
15	Heat	K = ◦C + 273	Table T: Temperature	1:13
16	Heat	melting point	Table S: melting point	0:59
17	Heat	sublimation	solid (s) to gas (g); Ex. Carbon dioxide (CO_2) & Iodine (I_2)	1:13
18	Atom	orbital	the most probable location of an electron	0:21
19	Atom	Nucleus and nuclear charge	contains positive protons (atomic number) & neutral neutrons	1:52
20	Atom	Sub-atomic particle charge	Table O, bottom numbers	1:21
21	Atom	Sub-atomic particle mass	Table O, top numbers	1:59
22	Atom	All ATOMS are electrically neutral	number of protons = number of electrons	1:49
23	Atom	Isotopes	same number of protons (atomic number), different number of neutrons	1:31
24	Atom	Atomic Mass	weighted average of the naturally occurring isotopes of an element	2:38
25	Atom	Electron configuration	ground state: lower left corner of boxes in Periodic Table of Elements excited state: when electrons move to further shells; no change in electron #	3:13
26	Atom	Electron movement	low to high, energy absorbed; high to low, energy released as light (spectra)	2:25
27	Atom	Bright-Line Spectra	used to identify elements; all lines need to match	1:12

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28	Nuclear	Transmutation	an atom of an element is converted to an atom of a different element; natural (spontaneous) = by itself; artificial (bombard) = not by itself	1:53
29	Nuclear	Decay Mode	Table N	2:23
30	Nuclear	Fusion	2 Hydrogen's (H) unite to form 1 Helium (He); mass is converted to energy	2:04
31	Nuclear	Fission	Uranium splits into pieces, neutrons; mass is converted to energy	1:15
32	Nuclear	Radioisotopes	I-131 - thyroid disorders; C-14 - fossils; Co-60 - treat cancer; U-238 - Earth	1:07
33	Nuclear	Nuclear Risks/Benefits	usually in reading passage	1:32
34	Periodic Table	Periodic Table Arrangement	increasing atomic number	0:33
35	Periodic Table	Properties of metals/nonmetals	good conductors of electricity, malleable (bendable)/ poor conductors of electricity, brittle (break easily)	1:47
36	Periodic Table	Valence electrons	outermost electrons	2:15
37	Periodic Table	Element type & location	metals: Groups 1 - 13; nonmetals: Groups 14 - 17, H; metalloids: B, Si, Ge, As, Sb, Te; noble gases: Group 18.	2:33
38	Periodic Table	Similar properties	same group (Groups 1, 2, 13 - 18), same number of valence electrons	1:35
39	Periodic Table	Atomic radius: Ionic radius:	(Table S); distance from nucleus to outermost shell of electrons metals lose electrons (+), get smaller; nonmetals gain electrons (-), get bigger	2:54
40	Periodic Table	Electronegativity	attraction for electrons (Table S); (metals) weak 0.0 - 4.0 strong (nonmetals)	1:51
41	Periodic Table	Ionization Energy	energy to remove an electron (Table S)	0:54
42	Periodic Table	Trends	Down a group, atomic radius increases; everything else is the opposite.	3:35
43	Bonding	Break a bond / Form a bond	energy is absorbed / energy is released	0:57
44	Bonding	Ionic bond	TRANSFER of electrons from a metal to a nonmetal	1:46
45	Bonding	Nonpolar covalent bond	2 of the same nonmetals; polar covalent = 2 different nonmetals;	2:09
46	Bonding	covalent bond	when 2 nonmetals share a pair of electrons; X–X or X·X	1:25
47	Bonding	Ionic & Covalent	metal, nonmetal, nonmetal	1:40
48	Bonding	Compounds	ionic (metal/nonmetal); molecular (nonmetal/nonmetal)	1:27
49	Bonding	Stable octet	8 valence electrons; Group 18 - generally unreactive	1:51
50	Bonding	Dot diagrams	valence electrons for atoms, stable octets for molecules/compounds	4:01
51	Bonding	Most polar bond	greatest difference in electronegativity (Table S)	2:33
52	Bonding	Molecular Polarity	polar molecules: asymmetrical (HCl, H_2O, NH_3) nonpolar molecules: symmetrical (CX_2, CX_4, X_2)	2:31
53	Bonding	High Boiling Point	STRONG intermolecular forces	2:00
54	Bonding	Hydrogen Bonding	strong intermolecular forces; high boiling point of water	0:54

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Way	Topic	Main Concept	Explanation	Video Length (min:sec)
55	Formula Writing	From molecular formula to empirical formula	divide by the greatest common factor	2:34
56	Formula Writing	Types of Reactions	Synthesis: A + B → AB Decomposition: AB → A + B	1:35
57	Formula Writing	Types of Reactions	Single Replacement: A + BC → AC + B	1:33
58	Formula Writing	Formula Writing	criss cross oxidation states; Roman numerals: (I) = +1, (II) = +2, etc. -ide = binary, 2 elements only, use top most oxidation state	3:52
59	Formula Writing	Reverse Criss-Cross	tells you what group number an element is located in on the Periodic Table; (+, -)	2:12
60	Chemistry Math	Graphing	ensure scale has equal intervals; plot points correctly	3:00
61	Chemistry Math	Density	Table T: Density; Table S	3:16
62	Chemistry Math	Conservation of Mass	mass before MUST equal mass after	2:42
63	Chemistry Math	Formula Mass	the sum of the atomic masses of the atoms	3:15
64	Chemistry Math	% Composition	Table T: Percent Composition	4:08
65	Chemistry Math	% by Mass	(mass of solute/mass of solution) x 100	2:25
66	Chemistry Math	Mole Calculation	Table T: Mole Calculations	2:12
67	Solutions	Table F	soluble or insoluble; aqueous (aq) = dissolved in water	2:41
68	Solutions	Solubility vs. Temperature	Table G	1:08
69	Solutions	Table G	unsaturated "below the line", saturated "on the line", superaturated "above the line" watch out for multiples of 100!	2:57
70	Solutions	Molarity	moles of solute / liters of solution; Table T: Concentration	2:07
71	Solutions	parts per million	(mass of solute / mass of solution) x 1,000,000; Table T: Concentration	3:23
72	Solutions	Boiling point (BP) & Freezing Point (FP)	For a solution, the BP increases & the FP decreases; the more ions, the greater the effect.	3:30
73	Kinetics/Equilibrium	Chemical reactions Faster reaction rate	require effective collisions increase temperature: more effective collisions, more energy	1:14
74	Kinetics/Equilibrium	faster reaction rate	increase concentration	3:19
75	Kinetics/Equilibrium	faster reaction rate	increase surface area, (POWDER)	1:08
76	Kinetics/Equilibrium	Exothermic Endothermic Entropy	heat is released, → energy (kJ) heat is absorbed, energy (kJ) → disorder; (s) → (l) → (g), entropy increases	1:27
77	Kinetics/Equilibrium	Table I	A minus sign indicates an exothermic reaction	3:09
78	Kinetics/Equilibrium	Heat of Reaction	ΔH = PE of products - PE of reactants	1:59
79	Kinetics/Equilibrium	Potential Energy Diagrams	Exothermic: High to Low; Endothermic: Low to High	1:29
80	Kinetics/Equilibrium	Catalyst	increases the rate of a reaction by lowering the activation energy	1:58
81	Kinetics/Equilibrium	Equilibrium	The RATE of the forward reaction is EQUAL to the RATE of the reverse reaction The CONCENTRATIONS are CONSTANT	1:25

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82	Acid/Base	Arrhenius Acid	Table K; $H^+(aq)$ or $H_3O^+(aq)$; the only positive ion in a solution	2:08
83	Acid/Base	Arrhenius Base	Table L; $OH^-(aq)$, hydroxide; the only negative ion in a solution	2:17
84	Acid/Base	Acid-Base Theory: Acid Base	an H^+ donor an H^+ acceptor	2:52
85	Acid/Base	Neutralization	Acid + Base → Water + Salt (H^+, Table K) + (OH^-, Table L) → (H_2O) + (M/NM)	3:24
86	Acid/Base	pH Scale	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14; a change by 1 = a change by 10x acid (H_3O^+) hydronium base (OH^-) hydroxide	3:25
87	Acid/Base	Table M	uses colored indicators to tell pH	3:00
88	Acid/Base	Titration	a process of determining the concentration of a solution	0:48
89	Acid/Base	Electrolyte	a substance that conducts electricity when dissolved in water (aq) Examples: acids (Table K), bases (Table L), salts (M/NM)	1:28
90	Electrochemistry	REDOX Reactions	REDuction = gain electrons, - OXidation = lose electrons, + look for an element by itself	2:19
91	Electrochemistry	Relative Activity	Table J: The higher the element, the more ACTIVE it is; (SPONTANEOUS)	2:24
92	Electrochemistry	Voltaic Cell	chemical energy → electrical energy; salt bridge: migration of ions	1:12
93	Electrochemistry	Electrolytic cell	converts electrical energy (battery) to chemical energy	1:24
94	Electrochemistry	Anode Cathode	site of oxidation, AN=OX, LEO, (+) site of reduction, RED=CAT, GER, (-)	2:34
95	Organic Chemistry	Organic	carbon	0:48
96	Organic Chemistry	Homologous series	Table Q, Hydrocarbons alkanes, alkenes, alkynes	2:29
97	Organic Chemistry	Saturated hydrocarbons Unsaturated hydrocarbons	single bonds only between carbon atoms double or triple bonds between carbon atoms	2:57
98	Organic Chemistry	Organic functional groups	Table R	2:34
99	Organic Chemistry	Isomers	same molecular formulas, different structural formulas	2:13
100	Organic Chemistry	Organic reactions	saponification (soap) combustion (oxygen, O_2)	1:37

Top 50 Concepts on the Chemistry Regents