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| **SUGGESTED CHEM 101 SYLLABUS** | | | | |
| **Text book: Raymond Chang, Chemistry, 10th edition, 2010** | | | | |
| **Topics** | **Text book pages** | | Number of Lecture | |
| ***Matter and Measurements*** | | | | |
| **1.4** Classifications of Matter: substances and mixtures, elements and compounds.  *How to right symbols of Elements (the table and the explanation (P 12)*  **1.5** The Three States of Matter  **1.6** Physical and Chemical properties of Matter: intensive and extensive properties  **1.7** Measurement: SI units, mass and weight, volume, density, temperature scales  **1.9** Dimensional Analysis in Solving Problems: conversion factors, a note on problem solving | **10 - 22**  **27- 31** | | **4** | |
| ***Review and Exercises*** | | |
| ***Atoms, Molecules and Ions*** | | | | |
| **2.2** The Structure of the Atoms: the electron, the proton and the neutron.  *only definitions, masses, and charges*  [Radioactivity is excluded]  **2.3** Atomic Number, Mass Number and Isotopes  **2.4** The Periodic Table  *Periods and groups 1 to 18 - Metals and nonmetals - Alkaline, alkaline earth, halogens, and noble gases.*  **2.5** Molecules and Ions: molecules, ions.  *Diatomic molecules and polyatomic molecules - Homonuclear monatomic molecules, homonuclearmultiatomic molecules, and heteronuclear molecules (= Covalent compounds) - Ions (monatomic ions and polyatomic ions)*  **2.7** Naming Compounds: ionic compound, molecular compound, acids and bases, familiar inorganic compound | **43 - 54**  **59 - 68** | | **5** | |
| ***Review and Exercises*** | | |
| ***Quantum Theory and the Electonic Structure of Atoms*** | | | | |
| **7.6** Quantum numbers.  **7.7** Atomic Orbitals.  **7.8** Electron Configuration. | | **294 - 307** | | **3** |
| ***Review and Exercises*** | | | |
| ***Periodic Relationships Among the Elements*** | | | | |
| **8.2** Periodic Classification of the elements.  **8.3** Periodic Variation in Physical Properties (only atomic radius).  **8.4** Ionization Energy*.*  **8.5** Electron Affinity.  (sections **8.4** and **8.5** can be confined only in properties without more details) | | **326 – 332**  **337 - 343** | | **3** |

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| ***Review and Exercises*** |

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| ***First Exam*** | | |
| ***Stoichiometry and Chemical Equations*** | | |
| **3.1** Atomic Mass: average atomic mass  **3.2** Avogadro's Number and the Molar Mass of an Element  **3.3** Molecular Mass  **3.5** Percent Composition of Compounds  **3.6** Experimental Determination of Empirical Formulas: determination of molecular formulas  **3.7** Chemical Reactions and Chemical Equations: writing chemical equations, balancing chemical equations  **3.8** Amounts of reactants and products  **3.9** Limiting Reagents  **3.10** Reaction Yield | **80 – 87**  **88 – 107** | **6** |
| ***Review and Exercises*** | |
| ***Gases*** | | |
| **5.1** Substances That Exist as Gases  **5.2** Pressure of a Gas: SI units of pressure, atmospheric pressure.  [Manometer is excluded]  **5.3** The Gas Laws: the pressure-volume relationship: Boyle's Law, the temperature-volume relationship: Charles's and Gay-Lussac's law, the volume-amount relationship: Avogadro's Law  **5.4** The Ideal Gas Equation: density calculation, the molar mass of a gaseous substance  **5.5** Gas Stoichiometry  **5.6** Dalton's law of Partial Pressures  **5.7** The Kinetic Molecular Theory of Gases  **5.8** Deviation from Ideal Behavior | **174 - 213** | **7** |
| ***Review and Exercises*** | |
| ***Thermochemistry*** | | |
| **6.3** Introduction to Thermodynamics: the first law of thermodynamics, work and heat  **6.4** Enthalpy of Chemical Reactions: enthalpy of reactions, thermochemical equations, a comparison of ∆H and ∆E.  **6.5** Calorimetry: **Only** specific heat and heat capacity  **6.6** Standard Enthalpy of Formation and Reaction: the direct method, the indirect method.  *The direct method (use of enthalpies of formation to calculate enthalpies of other reaction). The indirect method (Hess’s law and its use to calculate enthalpies of other reaction)* | **233 - 238**  **241 - 246**  **252 - 258** | **5** |
| ***Review and Exercises*** | |
| ***Second Exam*** | | |
| ***Solutions*** | | |
| **12.1** Types of Solutions  [Supersaturated solution is excluded]  **12.2** A Molecular View of the Solution Process  **4.5** Concentration of solution  **12.3** Concentration Units: types of concentration units, comparison of concentration units  *Molarity and dilution of solutions****,*** *Percent by mass, mole fraction, molarity*  **12.4** The Effect of Temperature od Solubility: solid solubility and temperature, gas solubility and temperature  [Fractional crystallization is excluded]  **12.5** The Effect of Pressure on the Solubility of Gases  **12.6** Colligative Properties of Nonelectrolyte Solutions: vapor-pressure lowering (Raoult's Law), boiling-point elevation, freezing-point depression, osmotic pressure, using colligative properties to determine molar mass  [Fractional distillation is excluded] | **514, 515**  **147 – 150**  **517 - 521**  **521 - 525**  **527, 528**  **530 - 538** | **7** |
| ***Review and Exercises*** | |
| **TOTAL HOURS** | | **42** |

**Practical**

**1.8** Handling Numbers: scientific notation, significant figures, accuracy and precision p22-27