UNIVERSITY OF HOUSTON – DOWNTOWN

ENGR 4410 - INDUSTRIAL HYGIENE INSTRUMENTATION

LECTURE NOTE OUTLINE – IONIZING RADIATION – CHAPTER 10

WEEK 9

I. Ionizing Radiation Terms
   - A. Activity
   - B. Alpha particle
   - C. Background radiation
   - D. Beta particle
   - E. Curie
   - F. Disintegration
   - G. Dose
   - H. Film badge
   - I. Gamma rays
   - J. Half-life
   - K. Ionizing Radiation
   - L. Isotope
   - M. Neutron
   - N. Quality factor
   - O. Radioactivity
   - P. Radioisotope
   - Q. Roentgen
   - R. Scintillation counter
   - S. Shielding
   - T. X-ray

II. Types of Ionizing Radiation
   - A. Alpha Particles
   - B. Beta Particles
   - C. Neutrons
   - D. X-Radiation
   - E. Gamma Radiation
   - F. Radioactive Decay Calculation

III. Biological Effects of Radiation
   - A. Types of Injuries
   - B. Relating Dosage to Damage

IV. Standards and Guides
- A. NCRP
- B. ICRP
- C. ALARA

V. Monitoring Instruments
- A. Film Badges
- B. Thermoluminescence Detectors
- C. Pocket Dosimeters
- D. Electronic Alarm Dosimeters
- E. Ionization Chambers
- F. Geiger-Mueller Counters
- G. Other monitoring instruments
- H. Calibration

VI. Basic Safety Factors
- A. Time
- B. Distance
- C. Shielding

VII. Control Programs
- A. Sources of Radiation
  1. Sealed Sources
  2. Radiation-Producing Machines
  3. Radioisotopes
  4. Radioactive Metals
  5. Criticality
  6. Plutonium
- B. Operational Factors
- C. Employee Exposure Potential
  1. External Hazards
  2. Internal Hazards
- D. Records

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ENGR 4410 - INDUSTRIAL HYGIENE INSTRUMENTATION

LECTURE NOTE OUTLINE – NONIONIZING RADIATION – CHAPTER 11

WEEK 9

I. Electric and Magnetic Fields
   - A. Electric
   - B. Magnetic

II. Electromagnetic Radiation
   - A. Electromagnetic Spectrum
   - B. Importance of Fields/Radiation
   - C. Parts of an Electromagnetic Device

III. Subradiofrequency Fields: 0 to 3,000 Hz
   - A. Field Strengths
   - B. Interact with Human Body
   - C. Effects/Standards for Steady DC Electric Fields
   - D. Effects/Standards for Static Magnetic Fields
   - E. Effects/Standards for Time-Varying Subradiofrequency Fields
   - F. Measurement
   - G. Controls and Shielding

IV. Radiofrequency/Microwave Radiation and Fields (RF/MW)
   - A. Industrial, Scientific, and Medical Bands
   - B. Interactions of Radiation and Matter
   - C. Effects/Standards
   - D. Dosimetry
   - E. Target Organs
   - F. Standard Setting Rationale
   - G. Averaging Time and Pulsed Fields
   - H. Regulatory Considerations
   - I. Measurement

V. VDTs and Microwave Ovens
   - A. VDTs
   - B. Microwave Ovens
   - C. RW/MW Controls

VI. Optical Radiation and Lasers
- A. CIE Bands
- B. Effects/Standards
  1. Eye
  2. Skin
  3. Standards
  4. Controls for Nonlaser Sources

VII. Laser
- A. Biological damage mechanisms
- B. Standards
- C. Controls
- D. Laser Pointers
- E. Nonbeam hazards of Lasers
- F. Other Regulatory Concerns
- G. Measurement

VIII. Lighting