

ENVIRONMENTAL (DOMAIN II – SHE Engineering)

ENVIRONMENTAL ENGINEERING QUESTIONS:

1. A cyclone scrubber is put on line with an electrostatic precipitator. The efficiency of the cyclone is 80%, while the ESP is 95%. Assuming the cyclone is last, what is the overall efficiency?
 - A. 99%
 - B. 99.9%
 - C. 99.99%
 - D. 99.999%

Domain **2** **Responsibility** **2**
CALCULATION

2. A point source will produce 1 pound of pollutant every hour. How many tons will be produced in one year assuming continuous 24-hour operation?
 - A. 2.2 tons
 - B. 2.4 tons
 - C. 3.6 tons
 - D. 4.4 tons

Domain **2** **Responsibility** **2**
CALCULATION

3. If you were milling asbestos, what effect would this have on the fibers?
 - A. nothing
 - B. reduce diameter
 - C. reduce diameter and shorten length
 - D. increase length, but reduce diameter

Domain **2** **Responsibility** **1**
COULD NOT FIND.

4. In the cyanide electroplating of brass, which of the following components may be released?
- A. HCl, HNO₃
 - B. MFG3
 - C. cyanide salts, NH₄OH
 - D. Zn salts

Domain 2 **Responsibility** 1
COULD NOT FIND.

5. In general, which of the following operations would require the greatest capture velocity to achieve effective exposure control?
- A. evaporation from surface tanks
 - B. spray booths
 - C. welding
 - D. grinding

Domain 2 **Responsibility** 2
Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5th Edition)." National Safety Council, 2002. Page 610, Table 19-A.

6. Reactive metals are usually welded under a shield of inert gas such as argon. Metals that are welded in this manner include aluminum & titanium. The major pollutants from such welding is (are):
- A. phosgene
 - B. ozone
 - C. UV light
 - D. B and C above

Domain 2 **Responsibility** 1
Construction Safety and Health Outreach Program: Welding Health Hazards
<http://www.osha.gov/doc/outreachtraining/htmlfiles/weldhlth.html>

7. Shock mounts are responsible for reducing which of the following especially.
- A. <500 HZ
 - B. <1,000 HZ
 - C. 1,000-2,000 HZ
 - D. none of the above

Domain 2 **Responsibility** 2
COULD NOT FIND.

8. What chemicals cause a green flame from a copper wire?
- A. combustible gases
 - B. trace concentrations of heavy metals
 - C. organic halide vapors
 - D. mercury vapors

Domain **2** **Responsibility** **1**
Bielstein Copper Wire Test for Halogenated Organics
<http://www.uwstout.edu/chemistry/ondrus/manual/pdf/demo8.pdf>

9. What instrument would be used to check for a refrigerant?
- A. DU flame spectrophotometer
 - B. halide meter
 - C. combustible gas indicator
 - D. gas chromatograph

Domain **2** **Responsibility** **1**
Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5th Edition)." National Safety Council, 2002. Page 160. (This explains that halogens are used as refrigerants)
And also:
Olishifski, Julian B. and McElroy, Frank E. (Eds). "Fundamentals of Industrial Hygiene." Chicago: National Safety Council, 1971. Page 71. (This explains that a halide meter is used to test for halogens)

10. Fumes are:
- A. solids
 - B. vapors
 - C. gases
 - D. liquids

Domain **2** **Responsibility** **1**
Plog, Barbara A. and Quinlan, Patricia J. (Eds). "Fundamentals of Industrial Hygiene (5th Edition)." National Safety Council, 2002. Page 22.

ENVIRONMENTAL ENGINEERING ANSWERS:

1. "A" $80\% + (20\%)95\% = 99\%$
2. "D"
$$\frac{1lb.}{hr.} \cdot \frac{24hrs.}{day} \cdot \frac{7days}{week} \cdot \frac{52weeks}{year} \cdot \frac{1ton}{2,000lbs.} = \frac{4.4tons}{year}$$
3. "C" Milling breaks up the original fibers resulting in both shorter and narrower product fibers.
4. "C" HCl and HNO₃ should never be used around cyanides because of the potential for HCN formation. Cyanide salts are commonly used for electroplating.
5. "D" Grinding operations release contaminants at high initial velocities. The other operations mentioned release contaminants with low velocities. Higher capture velocities are required to entrain the high-velocity particles from the grinding wheel.
6. "D" Metal Inert-Gas welding (MIG) produces relatively few metal fumes. It does, however, produce significant amounts of Ultra-Violet (UV) radiation and, as a secondary pollutant, ozone.
7. "A" Shock mounts and other mechanical vibration isolation techniques are most effective in controlling low-frequency vibration.
8. "C" Halides (including chlorinated and fluorinated hydrocarbons) increase the characteristic emissions of copper
9. "B" Refrigerants are mainly halogenated hydrocarbons; therefore the halide meter is the best measuring tool.
10. "A" Aerosols of solid particles are "fumes." Typical fumes would be condensed microscopic metal droplets melted originally by welding. Evaporates of materials that are typically liquids at ambient temperature and pressure are "vapors." Clouds are an example of water vapor. Materials that are typically gaseous at ambient temperatures and pressures are "gases." Air is a mixture of nitrogen, oxygen, and other gases.