SAFE OIL DISPOSAL & SMALL SPILL CLEANUP

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For Dr. Chun’s Organic Chemistry
Car Maintenance

- Change motor oil every three months or 3000 miles
- After changing oil, bottle it for transportation

It consists primarily of hydrocarbons, but crude oil contains at least several hundred different compounds.

• Straight and branched chain alkanes and alkenes having anywhere from 1 to 1,000 carbons.

• Hydrocarbon ring structures including cycloalkanes and aromatics.

• Sulfur compounds.

• Trace quantities of oxygen, nitrogen and heavy metals.
Biogenic Origin – Why We Call Them Fossil Fuels

- General Consensus: Crude oil formed from the remains of ancient plankton and algae through the processes of diagenesis and catagenesis over the course of tens of millions of years.

- How they know: the presence of “biomarkers” in crude oil samples.
The Site of Oil Generation

Why the Continental Shelf?

- Concentration of marine life, corals
- Low water circulation
- Receives regular deposits of sediment
Refining Process

- Crude oil is separated into its various components by fractional distillation.

http://www.energymanagertraining.com/petrochemical/img/pp2.jpg
- Contains hydrocarbons of 1–4 carbon atoms.
- Used as fuel, starting material for plastics, gasoline additives.

- Contains hydrocarbons of 5–12 carbon atoms.
- Used as motor fuel, industrial solvents.

- Contains hydrocarbons of 12–16 carbon atoms.
- Used as fuel for lamps, stoves, tractors, diesel engines; starting material for the cracking process.

- Contains hydrocarbons of 15–18 carbon atoms.
- Used as starting material for cracking and for heating oils for industry, and for diesel fuel.

- Contains hydrocarbons of 16–20 carbon atoms.
- Used as lubricants.

- Residue material. Contains hydrocarbons of more than 20 carbon atoms that do not vaporize at 370 °C. Contains paraffin, waxes, asphalt, coke.
- Can be separated further to produce other products.
Refining Process

After Fractionating:

• Fractions are passed through a column of sulfuric acid to remove alkenes and nitrogen and oxygen compounds.

• Fractions are passed through an absorption column to remove water.

• Fractions are passed through hydrogen sulfide scrubbers to rid the oil of sulfur compounds.
Motor Oil Additives

10-20% of the contents of a can of motor oil is the additive package.

- Anti-oxidant additives
- Corrosion inhibitors
- Detergent additives
- Anti-foaming agents
- Friction modifiers
- Viscosity modifiers
How Motor Oil Becomes “Used” Motor Oil

- Oxidation
- Shearing – carbon chains are broken.
- Contamination – e.g. water, glycol.

Gross Things Found in Used Motor Oil

- Arsenic
- Cadmium
- Benzene
- Lead
- Zinc
- Barium
Safe Method of Oil Disposal

- Free drop off at local businesses:
  - Autozone
  - O’Reillys
  - Advanced Auto
  - University Tire and Auto, Inc
  - Rainbow Service Tech
  - Express Lube
  - Grease Pig
  - Wal-mart

Second Life of Used Motor Oil

- Re-refining by use of vacuum and fractional distillation techniques.
- Simple filtration to remove heavy impurities.
- Burn it to generate electricity, run paper mills, melt asphalt, etc.
Remediation of Small Oil Spills on Soils

- Soil microbes can degrade motor oil effectively if:
  - Motor oil is bioavailable
  - Correct Carbon:Nitrogen:Phosphorus is present
  - Aerobic conditions exist in the soil
Location of Spill

- If located near a water way or on slope place a barrier around the spill while remediating it.
- Motor oil can be fatal to aquatic invertebrates which feed many fish species.
- Barriers such as hay bales, silt fences, rocks can be used.
- The idea is to slow water coming on to and leaving the spill area.
Availability of Motor Oil

- Motor oil tends to stick to soil particle
- Not Available to soil microbes
- Simple Green is a common surfactant
- Apply enough to saturate contaminated area 4 inches in depth
Nutrient Additive

- Buy common garden or yard fertilizer at rates such as 13-13-13 or another rate, provided that the nitrogen is the same or more than the amount of phosphorus or potassium.
- Due that microbes need more nitrogen than P or K.
Tillage

- After applying Super Green and fertilizer till the contaminated area.

- This will help ensure:
  - that more of the soil comes in contact with the Super Green
  - that the fertilizers are more evenly spread to multiple depths
  - That the contaminated area remains aerobic
Remediation of Oil Spills on Pavement

- Add kitty litter, saw dust, laundry detergent, or sand to spill area
- Remove and properly dispose of absorbent, for more information access: Accessfayetteville.org
- Apply surfactant to spill area and lightly scrub, then apply another layer of absorbent and properly dispose of it
Results of Remediation

- Over time plants should begin to grow in area.
- Some plants are more tolerant of motor oil contamination and those plants will grow first.

www.austintek.com
For Information

- Brochures have been placed around the NWACC Campus
Citations