Table 3 .... Vapor Capacity Index of 50-min. Activated Coconut Shell Carbon[23,a]

The capacity index has the following meaning:

4—High capacity for all materials in this category. One pound takes up about 20% to 50% of its own weight—average about ⅓ (33⅓%). This category includes most of the odor causing substances.

3—Satisfactory capacity for all items in this category. These constitute good applications but the capacity is not as high as for category 4. Adsorbs about 10 to 25% of its weight—average about ⅙ (16.7%).

2—Includes substances which are not highly adsorbed but which might be taken up sufficiently to give good service under the particular conditions of operation. These require individual checking.

1—Adsorption capacity is low for these materials. Activated charcoal cannot be satisfactorily used to remove them under ordinary circumstances.

2—Acetaldehyde
4—Acetic acid
4—Acetic anhydride
3—Acetone
1—Acetylene
3—Acids

3—Acrolein
4—Acrylic acid
4—Acrylonitrile
4—Adhesives
4—Alcohol
4—Alcoholic beverages

2—Amines
2—Ammonia
4—Amyl acetate
4—Amyl alcohol
4—Amyl ether
3—Animal odors

3—Anesthetics
4—Aniline
4—Antiseptics
4—Asphalt fumes
3—Automobile exhaust
3—Bacteria

4—Bathroom smells
4—Benzene
3—Bleaching solutions
4—Body odors
4—Bromine
4—Burned flesh

4—Burned food
4—Burning fat
3—Butadiene
2—Butane
4—Butanone
4—Butyl acetate

4—Butyl alcohol
4—Butyl cellosolve
4—Butyl chloride
4—Butyl ether
2—Butylene
2—Butyne

3—Butyraldehyde
4—Butyric acid
4—Camphor
4—Cancer odor
4—Caprylic acid
4—Carbolic acid

3—Carbon bisulfide
1—Carbon dioxide
1—Carbon monoxide
4—Carbon tetrachloride
4—Cellosolve
4—Cellosolve acetate

4—Charred materials
4—Cheese
3—Chemicals
3—Chlorine
4—Chlorobenzene
4—Chlorobutadiene

4—Chloroform
4—Chloro nitropropane
4—Chloropicrin
4—Cigarette smoke
4—Citrus and other fruits
4—Cleaning compounds

3—Coal smoke
3—Combustion odors
4—Cooking odors
3—Corrosive gases
4—Creosote
4—Cresol

4—Crotonaldehyde
4—Cyclohexane
4—Cyclohexanol
4—Cyclohexanone
4—Cyclohexene
4—Dead animals

4—Decane
4—Decaying substances
4—Decomposition odors
4—Deodorants
4—Detergents
4—Dibromoethane

4—Dichlorobenzene
3—Dichlorodifluoromethane
4—Dichloroethane
4—Dichloroethylene
4—Dichloroethyl ether
3—Dichloromonofluoromethane

4—Dichloro-nitroethane
4—Dichloropropane
3—Dichlorotetrafluoroethane
3—Diesel fumes
3—Diethyl amine

4—Diethyl ketone
4—Dimethylaniline
4—Dimethylsulfate
4—Dioxane
4—Dipropyl ketone
4—Disinfectants

4—Embalming odors
1—Ethane
3—Ether
4—Ethyl acetate
4—Ethyl acrylate
4—Ethyl alcohol

3—Ethyl amine
4—Ethyl benzene
3—Ethyl bromide
3—Ethyl chloride
3—Ethyl ether
3—Ethyl formate

4—Ethyl mercaptan
4—Ethyl silicate
1—Ethylene
4—Ethylene chlorhydrin
4—Ethylene dichloride
3—Ethylene oxide

4—Essential oils
4—Eucalyptole
3—Exhaust fumes
4—Female odors
4—Fertilizer
3—Film processing odors

4—Fish odors
4—Floral scents
3—Fluorotrichloromethane
4—Food aromas
2—Formaldehyde
3—Formic acid

2—Fuel gases
3—Fumes
4—Gangrene
4—Garlic
4—Gasoline
4—Heptane

4—Heptylene
3—Hexane
3—Hexylene
3—Hexyne
4—Hospital odors
4—Household smells

1—Hydrogen
2—Hydrogen bromide
2—Hydrogen chloride
3—Hydrogen cyanide
2—Hydrogen fluoride
3—Hydrogen iodide

2—Hydrogen selenide
3—Hydrogen sulfide
4—Incense
4—Indole
3—Inorganic chemicals
3—Incomplete combustion

3—Industrial wastes
4—Iodine
4—Iodoform
4—Irritants
4—Isophorone
3—Isoprene

4—Isopropyl acetate
4—Isopropyl alcohol
4—Isopropyl ether
4—Kerosene
4—Kitchen odors
4—Lactic acid

4—Lingering odors
4—Liquid fuels
4—Liquor odors
4—Lubricating oils and greases
4—Masking agents

4—Medicinal odors
4—Melons
4—Menthol
4—Mercaptans
4—Mesityl oxide
1—Methane

3—Methyl acetate
4—Methyl acrylate
3—Methyl alcohol
3—Methyl bromide
4—Methyl butyl ketone
4—Methyl cellosolve

4—Methyl cellosolve acetate
3—Methyl chloride
4—Methyl chloroform
3—Methyl ether
4—Methyl ethyl ketone
3—Methyl formate

4—Methyl isobutyl ketone
4—Methyl mercaptan
3—Methylal
4—Methylcyclohexane
4—Methylcyclohexanol
4—Methylcyclohexanone

4—Methylene chloride
3—Mildew
4—Mixed odors
3—Mold
4—Monochlorobenzene
3—Monofluorotrichloromethane
4—Moth balls
4—Naphtha (Coal tar)
4—Naphtha (Petroleum)
4—Naphthalene
4—Nicotine
3—Nitric acid

4—Nitro benzenes
4—Nitroethane
2—Nitrogen dioxide
4—Nitroglycerine
4—Nitromethane
4—Nitropropane

4—Nitrotoluene
4—Nonane
3—Noxious gases
4—Octalene
4—Octane
4—Odors

4—Odorants
4—Onions
4—Organic chemicals
4—Ozone
4—Packing house odors
4—Paint and redecorating odors
4—Palmitic acid
4—Paper deteriorations
4—Paradichlorbenzine
4—Paste and glue
3—Pentane
4—Pentanone

3—Pentylene
3—Pentyne
4—Perchloroethylene
4—Perfumes, cosmetics
4—Perspirations
4—Pet odors

Table 3 .... Vapor Capacity Index of 50-min. Activated Coconut Shell Carbon (Concluded)

4—Phenol
3—Phosgene
4—Pitch
4—Plastics
3—Poison gases
3—Pollen

4—Popcorn and candy
4—Poultry odors
2—Propane
3—Propionaldehyde
4—Propionic acid
4—Propyl acetate

4—Propyl alcohol
4—Propyl chloride
4—Propyl ether
4—Propyl mercaptan
2—Propylene

2—Propyne
3—Putrefying substances
4—Putrescine
4—Pyridine
2—Radiation products
4—Rancid oils

4—Resins
4—Reodorants
4—Ripening fruits
4—Rubber
4—Sauerkraut
4—Sewer odors

4—Skatole
3—Slaughtering odors
4—Smog
4—Soaps
4—Smoke
3—Solvents

4—Sour milks
4—Spilled beverages
4—Spoiled food stuffs
4—Stale odors
4—Stoddard solvent
4—Stuffiness

4—Styrene monomer
4—Sulfur compounds
2—Sulfur dioxide
3—Sulfur trioxide
4—Sulfuric acid
4—Tar

3—Tarnishing gases
4—Tetrachloroethane
4—Tetrachloroethylene
4—Theatrical makeup odors
4—Tobacco smoke
4—Toilet odors

4—Toluene
4—Toluidine
4—Trichlorethylene
4—Turpentine
4—Urea
4—Uric acid

4—Valeric acid
4—Valericaldehyde
4—Vapors
4—Varnish fumes
4—Vinegar
3—Vinyl chloride

3—Viruses
3—Volatile materials
4—Waste products
3—Wood alcohol
4—Xylene

[a] Some of the contaminants listed in the table are specific chemical compounds, some represent classes of compounds, and others are mixtures and of variable composition. Activated charcoal's capacity for odors varies somewhat with the concentration in air, with humidity and temperature, and with the actual velocity used through the filters. The numbers given represent typical or average conditions and might vary in specific instances. The values in the table have been assembled from many sources including laboratory tests and field experience. In cases where numerical values were not available, the author has listed his opinion of the probable capacity based on general experience. The table should be used as a general guide only.

will cancel or counteract the objectionable odor. The result may be an odorless atmosphere, or one having a more desirable or less objectionable odor than the basic objectionable odor or the applied neutralizer. Obviously the selection of the antagonistic odor as well as the applicable amount requires considerable skill and is a matter for the specialist. The use of an odor counteractant results in a lower odor intensity and removal of the malodor as sensed by the nose.

Odors can be masked by other more desirable odors applied in the proper concentrations. A change in odor quality and increased intensity occurs with this process. This has been the work of the perfumer from ancient times. Chemical destruction of odors, neutralization, and masking have come into extensive use. Agents are available for deodorizing source materials such as rubber and plastics,[26] and industrial exhausts such as sulfur odors from a cement kiln,[27] or to remove odor from the enclosed air space or atmosphere that may be contaminated by cooking or tobacco smoke.[28] Some deodorants are standard items, while others are compounded for the special application. In some cases, the use of a deodorant results in the chemical destruction, neutralization, or masking of the odor, or a combination of them. The principles of odor masking are listed in Reference 1 as follows:

1. Odor masking is the process of cancelling one odor by superimposing another odor to create a more overpowering sensation, preferably pleasant.

2. The masking agent does not alter the composition of preexisting odors, but simply covers such odors during the period of its addition to, and presence in, the air.

3. Masking is an effect produced at the point of sense perception in the respiratory passages, together with final interpretation in the brain, and does not constitute an aromatic correction of the aerial components.

4. The application of an inherently pleasant masking agent to an offensive atmosphere may result in a final combination that is still objectionable as a consequence of odor incompatibilities.

5. The objectionable odor concentration must not be so intense that the masking agent is itself required in objectionable concentrations. In such cases, other control methods are indicated.

The threshold concentration, Classification 1 (not objectionable) on the sensory scale, of chemical and industrial odors and their physiological reactions has been developed by DallaValle and appears in the References 12 and 33. These data show no agreement of threshold concentrations for the various substances. Care must be taken never to use a reodorant to mask or cover up a toxic concentration of gas. Personnel in refineries and other industries are accustomed to the presence of odor as the signal that dangerous concentrations of gas are being reached.

Table 4 .... Yearly Requirement in Pounds of 50-min. Activated Coconut-Shell Carbon for Various Occupancies[a]

Residences	
Total per person	
Non-smoking	1
Smoking	2
Individual rooms per person	
Living room	0.5
Dining room	0.25
Kitchen	0.25
Toilet and bath	0.25
Bedroom	0.15
Laundry	0.15
Office	
Total per person	
Non-smoking	1
Smoking	2
Hotel, per person, average occupancy	2
School, per pupil	1.5
Hospital (room or ward), per bed	3
Laboratory (average), per person	3
Bar or tavern, per occupant	5

[a] Add up the amount of activated charcoal needed by units as indicated in the table. For example, if there are 6 people in an office, 3 of whom are smokers, and 3 non-smokers, a total of 9 lb for one year's service under average conditions is indicated.

Combustion Methods

Since the usual objectionable odors are combustible and can be destroyed by burning, combustion processes are employed for odor destruction in higher temperature gases. Where it is desired to remove odors from industrial exhausts at temperatures above 125 F, and where the gas density is