Gas Adsorbent Media Selection Guide
Selection by Application Type

Note 1: Many applications with heavy loading levels and mixed contaminants may require the use of two or more types of adsorbent medias in order to provide comprehensive removal and full life of each chemical media type. In this case, any media indicated as “1st Pass” should be selected to purify the air first. A media indicated as “2nd Pass” should be used downstream from the 1st pass in order to remove the remaining gases.

Note 2: Single vapor applications may require only one pass of media.

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TO CALCULATE POUNDS OF MEDIA REQUIRED PER YEAR USE FORMULA:

lbs of Media required = pounds of contaminant per year / % loading by weight (figure from selection chart)

TO CALCULATE POUNDS OF CONTAMINANT PER YEAR USE FORMULA:

lbs of contaminant per year = CFM x ppm of Contaminant x Molecular Weight x 0.00134 = pounds/year

(***Based on 24 Hr, 365 Day operation***)

Example: Contaminant = H₂S, CFM = 1000, ppm = 3 Continuous 24 Hr, 365 Day operation, MW H₂S = 34

lbs of H₂S / year = 1000 CFM x 3 ppm x 34 x 0.00134 = 136.7 lbs of H₂S / year

lbs of Media required = lbs of H₂S per year / % loading capacity

Select SNI @ 50% loading capacity
136.7 lbs per year / 0.50 = 274 lbs of SNI for 1 year capacity

Unisorb Canada considers the above as best available information but actual conditions vary in practice and may require further consultation before finalizing system design.
AC Activated Carbons

Description:
Activated carbons are one of the most cost effective methods of gas removal. Many types of activated carbons are available. Activated carbon is used for purifying air and water because it acts as an adsorbent, and can effectively remove particles and organics from water, and odors from air. One of the best materials for reducing risks to human health, this material is also aesthetically pleasing. Each activated carbon has its own specific benefit. Unless specified otherwise, Unisorb provides AC-X type carbon as a standard.

AC-X - Extruded Activated Carbon Because of its shape, performance, and low cost extruded carbon has become the standard over the past decade. Unisorb carbon has a low dust, high activity level, economical choice. Shape: 4mm Cylindrical

AC-G—Granular Activated Carbon Our standard virgin carbon is manufactured from select grades of bituminous coal under strictly controlled steam activation conditions. This carbon is irregularly shaped and granular in appearance. With a highly developed porous structure, large surface area, high adsorption rate, small bed resistance and high mechanical strength, it is suitable for a wide range of water treatment and vapor adsorption applications.

AC-C—Coconut Shell Carbon Produced from the shell of coconuts, this carbon is considered the finest in the world for air purification. The reason for this is that the coconut shell forms pores which are just the right size to capture many gases and odors. Coconut shell carbon has a higher pressure drop (1.8” per foot at 70 fpm)

Physical Characteristics: Shape: Flat

General Specifications
1. Carbon Tetrachloride Activity (wt. %) 60min.
2. Iodine Number (mg/g) 1200 min.
3. Hardness Number 95% min.
4. Apparent Density (g/ml) 0.44 typical
5. Total Surface Area (N₂ -- BET method) 1150 - 1250 m²/gm
6. Total Ash Content 5% max.
7. Moisture 5% max.
8. Mesh Sizes: 4 x 6, 4 x 8, 4 x 10

CAUTION: WET ACTIVATED CARBON DEPLETES OXYGEN FROM AIR - Whenever workers enter a vessel containing carbon, all precautions must be taken since dangerously low levels of oxygen may be encountered.

Remaining Life Testing: In some cases Unisorb Canada can provide free quarterly media testing for the life of the carbon installation. This testing provides critical data including remaining carbon life, total life prediction, moisture content, and projected replacement date. Date is provided for each of the separated components of a blend. All analysis are performed at our own laboratory.
SNI
High Capacity Carbon

Description:
SNI was recently developed to provide our customers with an economical and safe carbon media with the highest capacity and bed life for H2S and biological odor control systems using a non impregnated carbon.
SNI has high capacity for elimination of all typical sewage odors including Hydrogen Sulphide, mercaptans, ammonia, indoles, and other organic and reduced sulphur compounds.
Disposal of SNI is simplified since it is not impregnated with any classified or dangerous chemistries, nor does it cause the generation of hazardous compounds.
SNI reduces the risk of bed fires associated with caustic impregnated types of products.

Specifications:

General Description: Porous, granular surface activated carbon.

Properties:
- H2S Removal Capacity (by volume): 0.22g/cc
- H2S Removal Capacity (by weight): 50%
- Surface Area: 1050 m2/g
- Density: 0.41 g/mL
- Moisture Content: 3%
S2 Acid Gas Adsorbent

**Description:**
S2 has been used in the pulp & paper and petrochemical oil and gas refinery markets for over forty years. This product targets those gases which are predominant in this environment, especially Hydrogen Sulphide. S2 starts with the highest grade activated carbon. This ensures that the greatest possible adsorption capacity is reached. The carbon is then impregnated with an acid gas neutralizing compound and a proprietary reagent which improves its neutralizing efficiency. This product is designed to perform exceptionally well in all scrubbers.

**Specifications:**

**General Description:** Porous, cylindrical pellets of high grade bituminous activated carbon.

**Properties:**
- **H2S Removal Capacity (by volume):** 0.16 g/cc
- **Removal Capacity by weight:** H2S: 26% ; SO2: 7% ;Cl2: 10%
- **CTC value:** 70% min
- **Surface Area:** 1050 m2/g
- **Density:** 580 kg/m3
- **Moisture Content:** 15%
- **Hardness:** 97 min
- **Ignition Temperature:** 425 C

**Media Remaining Life Testing:** Unisorb Canada provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining carbon life, remaining impregnate content, total life prediction, moisture content, and projected replacement date. Data is provided for each of the separated components of a blend. All analysis are performed at our own laboratory.
SXL Acid Gas Adsorbent

Description:
SXL was recently developed to provide our customers with the highest extended life. While it targets the same gases as S2, SXL has a capacity for Hydrogen Sulphide (H2S) which is roughly 60 percent greater than any other product in the market. SXL starts with the highest grade activated carbon. This ensures that the greatest possible adsorption capacity is reached. The carbon is then impregnated with an acid gas neutralizing compound and two proprietary reagents which improve its neutralizing and adsorption efficiency.

SXL performs exceptionally well in municipal odor control scrubbers where extremely high levels of H2S and other odorous organics exist.

Specifications:
General Description: Porous, cylindrical pellets of high grade bituminous activated carbon.
Properties:
- H2S Removal Capacity by weight: min 50%
- Removal Capacity (by weight): SO2: 11%; Cl2: 16%;
- CTC value: 70% min
- H2S: 0.308g/cc
- Surface Area: 1050 m2/g
- Density: 580 kg/m3
- Moisture Content: 15%
- Hardness: 97 min
- Ignition Temperature: 425 C

Media Remaining Life Testing: Unisorb Canada Ltd. provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining carbon life, remaining reagent content, total life prediction, and projected replacement date. All analyses are performed at our own laboratory.
PA 8 Adsorbent Media

Description:
PA 8 has been developed to have roughly twice the capacity of PA4 media. This second generation adsorbent media was developed in order to provide customers with the maximum adsorption benefit at the minimum cost. PA 8 targets a broad range of gases which cause corrosion, odor, and other undesirable gases. PA8 starts with the highest grade activated alumina. This ensures that the greatest possible adsorption capacity is reached. This alumina is then impregnated with permanganates while being formed into a spherical ball. A proprietary additive is used during the process in order to keep all eight percent of the permanganate available for reaction.

Specifications:
- General Description: Spherical balls pellets formed from a combination of powdered activated alumina and other binders, suitably impregnated with permanganates to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants.
- Removal Capacity:
  - Hydrogen Sulfide: 0.13 g/cc min (16 % by weight)
  - Sulfur Dioxide: 0.06 g/cc min (3.5% by weight)
  - Nitric Oxide: 0.06 g/cc min (2.5% by weight)
  - Nitrogen Dioxide: 0.016 g/cc min (1.0 % by weight)
  - Formaldehyde: 0.023 g/cc min (1.4% by weight)
- Manufacturing Quality Assurance Standards:
  - Leach test (indication of porosity)- 180 minute or less
  - Permanganate content: 8 % minimum
  - Moisture Content: 20 % maximum
  - Crush Strength: 40 to 60 %
  - Abrasion Loss: 3.0 % maximum
  - Nominal pellet Diameter: 1/8" (approximately 4 mm), 85% after screening

Media Remaining Life Testing: Unisorb Canada provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining permanganate content, total life prediction, moisture content, and projected replacement date. Date is provided for each of the separated components of a blend. All analysis are performed at our own laboratory.

UL Rating: PA8 meets the requirements of a UL Class 1 fire rating.
ACPA Blend Adsorbent Media

Description:
ACPA 12 Blend adsorbent media is a 50 percent/50 percent blend of AC virgin bituminous activated carbon and PA8 permanganate based media which is designed for the broadest range removal of corrosive, odorous, or toxic gases.

Specifications:

PureAir AC Component
General Description: Porous, cylindrical pellets of high grade bituminous activated carbon.

Properties:
- Ash content: 2-3%
- CTC Percentage: 60 to 70 percent
- Surface area: 1200 square meters per gram minimum
- Density: 32 pounds per cubic foot nominal
- Mesh Size: 4 by 6, 90% after screening
- Hardness: 95

PA8 Component
General Description: Spherical porous balls formed from a combination of powdered activated alumina and other binders, suitably impregnated with potassium permanganate to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants.

Removal Capacity:
- Hydrogen Sulfide: 0.13 g/cc min (8.0% by weight)
- Sulfur Dioxide: 0.06 g/cc min (3.5% by weight)
- Nitric Oxide: 0.06 g/cc min (2.5% by weight)
- Nitrogen Dioxide: 0.016 g/cc (1.0 percent by weight)
- Formaldehyde: 0.023 g/cc (1.4% by weight)

Manufacturing Quality Assurance Standards:
- Leach test - 180 minute or less
- Potassium Permanganate content: 8 percent minimum
- Moisture Content: 20 percent maximum
- Crush Strength: 40 to 60 percent
- Abrasion Loss: 3.0 percent maximum
- Nominal pellet Diameter: 1/8” (approximately 3 mm), 85% after screening

Media Remaining Life Testing: Unisorb Canada provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining carbon life, remaining permanganate content, total life prediction, moisture content, and projected replacement date. Date is provided for each of the separated components of a blend. All analysis are performed at our own laboratory.
S2PA Blend Adsorbent Media

Description:
S2PA Blend adsorbent media is a 50 percent/50 percent blend of S2 acid gas removal media and PA8 permanganate based media and is designed for the removal of corrosive gases commonly found in the Pulp & Paper and Petrochemical/Refinery industries.

Specifications:
S2 Component
General Description: Porous, cylindrical pellets of high grade bituminous activated carbon.
Properties:
- H2S Capacity: 0.15 g/cc
- Capacity by weight: H2S: 26%; SO2: 7%; Cl2:10%
- CTC value: 70% min
- Surface Area: 1050 m2/g
- Density: 580 kg/m3
- Moisture Content: 15%
- Hardness: 97 min
- Ignition Temperature: 425 C

PA8 Component
General Description: Spherical porous pellets formed from a combination of powdered activated alumina and other binders, suitably impregnated with permanganates to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants.
Removal Capacity:
- Hydrogen Sulfide: 0.13 g/cc min (8.0% by weight)
- Sulfur Dioxide: 0.06 g/cc min (3.5% by weight)
- Nitric Oxide: 0.06 g/cc min (2.5% by weight)
- Nitrogen Dioxide: 0.016 g/cc (1.0 percent by weight)
- Formaldehyde: 0.023 g/cc (1.4% by weight)

Manufacturing Quality Assurance Standards:
- Leach test - 180 minute or less
- Potassium Permanganate content: 8 percent minimum
- Moisture Content: 20 percent maximum
- Crush Strength: 40 to 60 percent
- Abrasion Loss: 3.0 percent maximum
- Nominal pellet Diameter: 1/8" (approximately 3 mm), 85% after screening

Media Remaining Life Testing: Unisorb Canada provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining carbon life, remaining permanganate content, total life prediction, moisture content, and projected replacement date. Date is provided for each of the separated components of a blend. All analysis are performed at our own laboratory.

UL Rating: S2PA Blend meets a UL Class 2 rating.
MK5 HCl Vapor Adsorbent

Description:
MK5 adsorbent media is specifically designed to capture and destroy atmospheric vent releases of HCl vapors at a minimum 95% removal efficiency in a properly designed deep bed configuration. MK5 will react with HCl vapors to produce a harmless byproduct which can be disposed of as a non-hazardous solid waste.

Specifications:
- **HCl Vapor Removal Capacity:** 10% by weight
- **Physical Structure:** A porous pellet which is formed from the combination of powdered activated alumina and specialized chemical reagents which enhance the capacity for removal of HCl Vapors.
- **Reaction Byproducts:** Produces solid reactants within the media which can not be chemically reversed.
- **Manufacturing Method:** The pellets are formed in such a manner that the impregnates are applied during the pellet formation so that the impregnates are distributed uniformly within the media. This ensures that the media is capable of adsorbing and removing chlorine or sulphur dioxide gas throughout the entire pellet.
- **Ignitability:** The media is completely non-flammable and meets a 300°C auto ignition level as defined by ASTM-3466-76.
- **Physical Properties:**
  - Moisture Content: 35% maximum
  - Average Crush Strength: 35-70% maximum
  - Average Abrasion: 4.5% maximum
  - Bulk Density: 45 lbs/ft$^3$ (720 kg/m$^3$)
  - Pellet diameter: .125” nominal
- **Pressure Drop (70°F Air):**
  - At 50 fpm face velocity: 0.45 IWC maximum per 12” media bed
  - At 100 fpm face velocity: 1.85 IWC maximum per 12” media bed

Media Remaining Life Testing: Unisorb Canada Ltd. provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining life, and projected replacement date. All analysis are performed at our own laboratory.

**UL Rating:** MK5 meets the requirements for a UL Class 2 fire rating.
AXA
Ammonia/Amine Adsorbent Media

Description:
AXA provides ideal adsorption of amines and other base compounds such as ammonia. It is developed from a highly activated carbon manufactured by steam activation. AXA has the perfect balance between adsorption and transportation pores enabling efficient adsorption and chemical reaction for a wide range of basic ammonia and amine vapors.

Specifications:
General Description: Porous, cylindrical pellets of high grade bituminous activated carbon.
Specifications:
- Ammonia Removal Capacity: 10% by weight
- CTC value: 60% min
- Surface Area: 1050 m2/g
- Density: 40 lbs/ft3 (641 kg/m3)
- Moisture Content: 2%
- Hardness: 97 min

Media Remaining Life Testing: Unisorb Canada provides free quarterly media testing for the life of the media installation. This testing provides critical data including remaining carbon life, remaining permanganate content, total life prediction, moisture content, and projected replacement date. Date is provided for each of the separated components of a blend. All analysis are performed at our certified laboratory.