

Gas sorption analyzer sample submission form

Static gas chemisorption analysis

Your name; _____

Your department; _____

Account number for billing; _____

Approximate description of the sample

Please provide as much information as possible about the sample, without revealing anything that is confidential. If the chemisorption analysis is targeting a particular active metal, e.g. Pt, Pd, Ru, Ir, Ni, Fe, etc., it will be helpful if you can say which metal it is, and say what you know about the active metal, e.g. weight percent of active metal, estimated active metal particle size and surface area, etc.

Amount of sample provided; _____ **grams**

Approximately 100 mg of sample is recommended for this analysis. Sample will be returned following analysis.

Active gas to be used; _____

This is the gas that will bind to the active metal by chemisorption. Usually hydrogen or carbon monoxide.

Sample pre-treatment (temp and gases); _____

A chemisorption analysis usually requires that the sample be pre-treated to put it in a clean state prior to gas chemisorption. Usually the pre-treatment involves one or more heating / cooling steps, usually under flowing inert gas such as helium. Sometimes steps involving sample oxidation / reduction are also included. If you are not sure what pre-treatment program to use, please consult with us prior to analysis.

Analysis temperature; _____ °C

This is the temperature at which active gas will be dosed onto the sample, to determine the amount that binds to active sites. May be done at any temperature but usually is between 20 and 50 C.

Analysis to be performed

A static gas chemisorption analysis consists of three parts; (1) sample pretreatment to prepare a clean sample surface; (2) adsorption isotherm measurement with active gas on the clean sample; and (3) adsorption isotherm re-measurement with active gas on the sample from (2) for which active sites are already filled. The amount of gas chemisorbed is determined by subtractive isotherm 3 from isotherm 2 and may be used to determine the surface area of active material.

Gas sorption analyzer sample submission form

Flowing gas chemisorption, Pulse / titration analysis

Your name; _____

Your department; _____

Account number for billing; _____

Approximate description of the sample

Please provide as much information as possible about the sample, without revealing anything that is confidential. If the chemisorption analysis is targeting a particular active metal, e.g. Pt, Pd, Ru, Ir, Ni, Fe, etc., it will be helpful if you can say which metal it is, and say what you know about the active metal, e.g. weight percent of active metal, estimated active metal particle size and surface area, etc.

Amount of sample provided; _____ **grams**

Approximately 100 mg of sample is recommended for this analysis. Sample will be returned following analysis.

Sample pre-treatment

A chemisorption analysis usually requires that the sample be pre-treated to put it in a clean state prior to gas chemisorption. Usually the pre-treatment involves heating / cooling steps, usually under flowing inert gas such as helium. Sometimes steps involving sample oxidation / reduction are also included. If you are not sure what pre-treatment program to use, please consult with us prior to analysis.

Active gas / flow gas to be used; _____

The active gas is the gas that will bind to the active metal by chemisorption. Usually hydrogen or carbon monoxide. Flow gas is the gas that carried the active gas to the sample. Usually nitrogen or helium.

Amount of active gas per pulse _____

This parameter usually depends on the amount of active material surface area present in your sample. Choices are, 25 μL , 50 μL , or 250 μL . If you are not sure what to recommend, please contact us to discuss.

Analysis temperature; _____

This is the temperature at which active gas will be dosed onto the sample in a series of flow pulses, to determine the amount that binds to active sites. May be done at any temperature but often is between 20 and 50 C.

Analysis to be performed

In this analysis the sample is subjected to a series of active gas pulses and the amount adsorbed from each pulse is recorded. The report will indicate the total amount of active gas adsorbed, and the corresponding surface area for active material in the sample.

Gas sorption analyzer sample submission form

Flowing gas chemisorption analysis; Thermally programmed desorption (TPD) analysis

Your name; _____

Your department; _____

Account number for billing; _____

Approximate description of the sample

Please provide as much information as possible about the sample, without revealing anything that is confidential. If the chemisorption analysis is targeting a particular active metal, e.g. Pt, Pd, Ru, Ir, Ni, Fe, etc., it will be helpful if you can say which metal it is, and say what you know about the active metal, e.g. weight percent of active metal, estimated active metal particle size and surface area, etc.

Amount of sample provided; _____ **grams**

Approximately 100 mg of sample is recommended for this analysis. Sample will be returned following analysis.

Sample pre-treatment

In this chemisorption analysis the sample is initially cleaned then dosed with an active chemisorptive gas which is subsequently removed during a temperature ramp. Pre-treatment usually involves heating / cooling steps, usually under flowing inert gas such as helium, followed by cooling and dosing with active gas. If you are not sure what pre-treatment program to use, please consult with us prior to analysis.

Active / flow gases to be used; _____

The active gas is the gas that will bind to the active metal by chemisorption for subsequent removal by a temperature ramp. Usually hydrogen or carbon monoxide, but ammonia and carbon dioxide are also sometimes used to test for acidic and basic sites respectively. Flow gas is the gas that flows over the sample and carries desorbed gases away during the temperature ramp. Usually nitrogen or helium.

Analysis temperature range; _____ °C

This is the temperature range over which the sample is heated to remove adsorbed gas, which is detected in a flowing stream of inert gas. A temperature ramp from ambient to a desired upper limit, often several hundred to up to 1100 C is used.

Analysis desired

A report from a flow chemisorption TPD analysis usually has the form of amount of gas desorbed vs. temperature. Detailed analysis of such data may reveal details regarding heat of adsorption / desorption and/ or activation energy for desorption. Please contact us regarding such an analysis if one is desired.

Gas sorption analyzer sample submission form

Flowing gas chemisorption analysis; Thermally programmed oxidation/reduction (TPO/R) analysis

Your name; _____

Your department; _____

Account number for billing; _____

Approximate description of the sample

Please provide as much information as possible about the sample, without revealing anything that is confidential. If the chemisorption analysis is targeting a particular active metal, e.g. Pt, Pd, Ru, Ir, Ni, Fe, etc., it will be helpful if you can say which metal it is, and say what you know about the active metal, e.g. weight percent of active metal, estimated active metal particle size and surface area, etc.

Amount of sample provided; _____ grams

Approximately 100 mg of sample is recommended for this analysis. Sample will be returned following analysis.

Sample pre-treatment

In this analysis the sample appropriately pre-treated then subjected to a temperature ramp while exposed to a reducing (TPR) or oxidizing (TPO) gas stream. Pre-treatment usually involves heating / cooling steps, usually under flowing inert gas such as helium, followed by cooling. Treatment with active gases is sometimes also included. If you are not sure what pre-treatment program to use, please consult with us prior to analysis.

Active / flow gases to be used; _____

For TPR the flow stream is usually 5% hydrogen in either nitrogen or argon, and for TPO the flow stream is usually 2% oxygen in helium. For other choices, please consult prior to analysis.

Analysis temperature range; _____ °C

This is the temperature range over which the sample is heated to remove adsorbed gas, which is detected in a flowing stream. A temperature ramp from ambient to a desired upper limit, often several hundred to up to 1100 C is used.

Analysis desired

A report from a flow TPR/TPD analysis usually has the form of amount of gas evolved vs. temperature, for a sample subjected to a temperature ramp while exposed to a reducing (TPR) or oxidizing (TPO) gas stream. This is a relatively specialized analysis; customers are asked to please contact us prior to requesting such an analysis, to discuss appropriate analysis parameters.