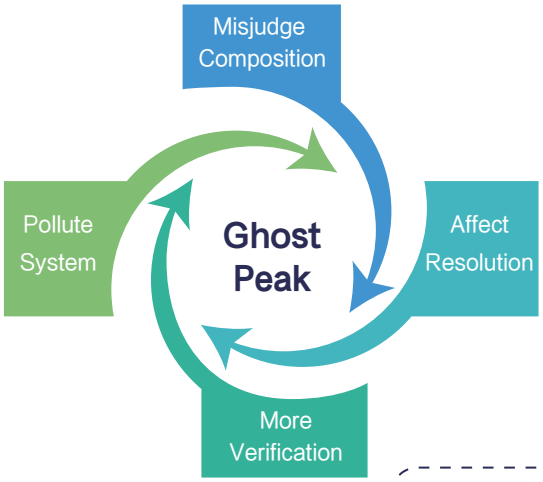
Ghost-Buster Column



What is Ghost Peak?

The peak appears erratically like ghost in chromatographic separation, especially during gradient elution or long-period operation.

Where is Ghost Peak from?

- Water, with impurities
- Purification System, polluted or poorly functioning
- Storage Containers, polluted or breeding bacteria
- Mobile Phase Additives, like salts, acids and alkalis
- Instrument, polluted after long-period use
- Other organic pollutants

Welch Ghost-Buster Column can effectively remove impurities with low polarity and thus prevents the interference from all kinds of ghost peaks. It is installed between gradient mixer and injector, which helps remove not only the impurities in mobile phase, but impurities in mixer and pipelines as well.

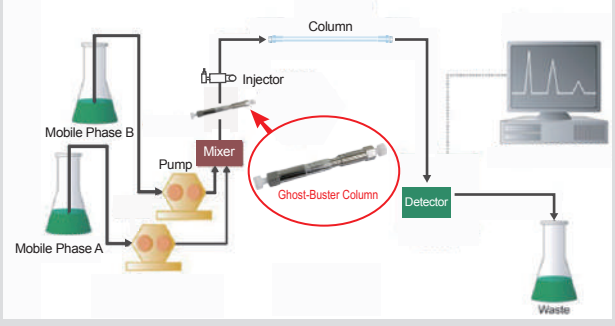
Operation Principles

Unlike in-line filters which removes only solid particles but not organic pollutants, Welch Ghost-Buster column provides strong adsorption to weak-polar and non-polar organic impurities, without changing the composition of mobile phase, thus to purify both mobile phase and system, remove most ghost peaks and extend lifetime of column and system.

Precautions

1. Install the column between Mixer and Injector. Being installed after injector would cause strong adsorption to samples and affect analysis.
2. For new analytical columns, flush Ghost-Buster column with 80% methanol solution at 1 mL/min for 20 min before new column switching to the system.
3. Not all impurities can be adsorbed by Ghost-Buster column.
4. Ion-pair solvents in mobile phase, would be adsorbed by Ghost-Buster column and affect retention and peak shape. Please use with caution under such mobile phases.
5. Column lifetime depends on analytical conditions, mobile phase and solvent purity. Routine change of Ghost-Buster column is suggested to ensure performance.
6. Ghost-Buster column is rather a purification part to the system, to filtrate impurities and protect column and system.
7. Before and after using buffer salt mobile phase, flush column with high-ratio water to transit, thus to avoid buffer salting out and blocking the column.
8. When Ghost-Buster column shows unsatisfying performance, try disconnect the outlet of the column and flush with 100% acetonitrile.

Install the Ghost-Buster column between Mixer and Injector. Sample solution must not flow through the column.



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Application and Results

Column: Ultisil® XB-C18, 4.6×250 mm, 5 μm
Flow Rate: 1.0 mL/min
Injection Volume: 10 μL
Detection: 210 nm
Temperature: 40℃
Sample Preparation: Ultra-pure water
Mobile Phase A: Ultra-pure water
Mobile Phase B: Acetonitrile

Time (min)	Mobile Phase A (%)	Mobile Phase B (%)
0	90	10
20	10	90
30	10	90
30.1	90	10
38	90	10

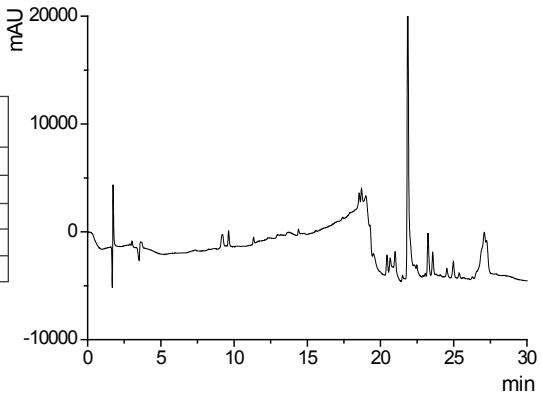


Figure 1: without Ghost–Buster column

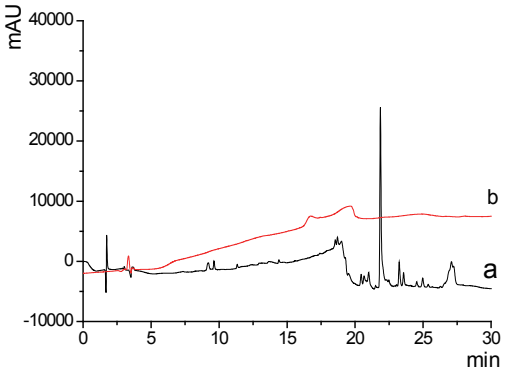


Figure 3: without Ghost–Buster column(a) and with Ghost–Buster column(b)

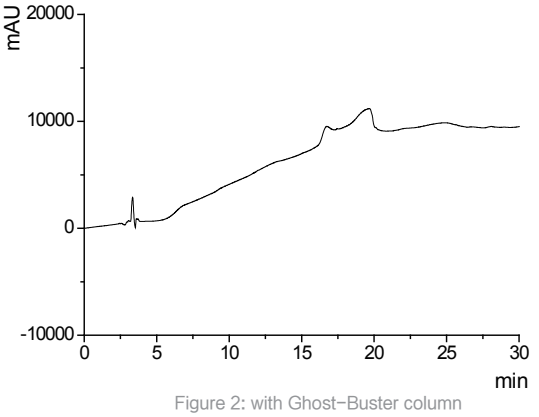


Figure 2: with Ghost–Buster column

Ordering Information

Name	P/N	Dimension	Pressure
Ghost-Buster Column	06100-31000	4.6×50 mm	40MPa
Ghost-Buster Column	06100-31001	7.8×50 mm	40MPa
Ghost-Buster HP Column	06100-31021	2.1×33 mm	100MPa
Ghost-Buster HP Column	06100-31025	2.1×50 mm	100MPa
Ghost-Buster Column Kit	GBKIT-01	4.6×50 mm, With 4 connectors and 2 pipelines	40MPa
Ghost-Buster Column Kit	GBKIT-02	7.8×50 mm, With 4 connectors and 2 pipelines	40MPa

Q&A

Q: For different samples and gradient conditions, should the Ghost-Buster column be removed or changed?
A: Not necessary. But it needs to be removed only for special circumstances like changing of peak position or ion-pair solvents mobile phase.

Q: When gradient elution changed to isocratic, should the Ghost-Buster column be removed?
A: No need to take the Ghost-Buster column if it did not affect the separation, as the elution of mobile phase stays same under isocratic condition. But impurities in mobile phase shall be taken into consideration.

Q: In gradient system, Ghost-Buster column increases the mixed dwell volume. Will this affect the separation?
A: The packing volume of a 4.6×50mm column is ~400 μL and the column is installed before the injector, which would cause little influence on the analysis. If it does, connect Ghost-Buster column to the water phase path before the mixer or switching valve.

Q: Any requirements for the connecting of Ghost-Buster column?
A: No special requirements for the connection. Common PEEK tube and connectors for HPLC system is recommended, as metal connectors may have the possibility of being stuck at column ends.

Ghost-Buster II Column

Further improvement, excellent performance!

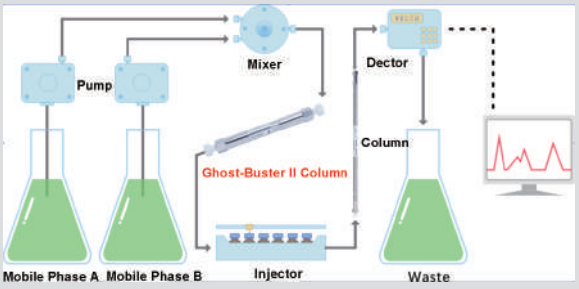
During HPLC analysis, especially gradient elution or after long-term system usage, some unexpected peaks, often called "Ghost Peaks", may appear in the chromatogram. Welch Materials original Ghost-Buster Column can capture ghost peaks, but sometimes this has been accompanied with baseline fluctuation which may affect the integration of some peaks.

Welch Materials is delighted to announce the launch of Ghost-Buster II Column, an upgraded and improved Ghost-Buster column, which can absorb mobile phase impurities and eliminate ghost peaks. At the same time, baseline drift caused by a high proportion of aqueous solvent in the gradient program will be minimized, which ensures the stable baseline.

Precautions

1. The new Ghost-Buster II Column , should be flushed with 80% methanol at 1.0mL/min for 4-5 hours before using.
2. Not all impurities can be adsorbed by the Ghost-Buster II Column.
3. The GB II column is not compatible with 100% aqueous mobile phases. Mobile phase A should contain at least 5% organic solvent.
4. Ion-pair solvents in mobile phase would be adsorbed by Ghost-Buster II column and affect retention and peak shape. Whether this type of mobile phase can be used should be determined by testing a new GB II column with the specific method.
5. Replacement of the GB II column is recommended once the trapping effect begins to deteriorate. We do not recommend a washing or clean up procedure due to the highly retentive nature of the GB II column packing materials.

Install Ghost-Buster II Column between injector and mixer. Samples must not pass through the Ghost-Buster II Column.

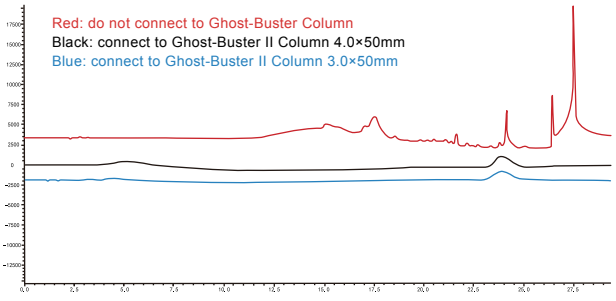


Stronger Capturing Effect

Ghost-Buster II Column uses a specifically optimized stationary phase and improved hardware. Ghost-Buster II Column removes impurities in the mobile phase with stronger retention.

Column: C18 column
GB Column: Ghost-Buster II Column, 3.0×50mm
Ghost-Buster II Column, 4.0×50mm
Mobile phase: A: 0.05% phosphoric acid solution B: acetonitrile
Gradient program:

Time/min	0	3	15	20	20.1	30
A/%	95	95	15	15	95	95
B/%	5	5	85	85	5	5



From the above case, it can be seen that Ghost-Buster II Column captures impurities with high retention and significantly improves baseline drift.

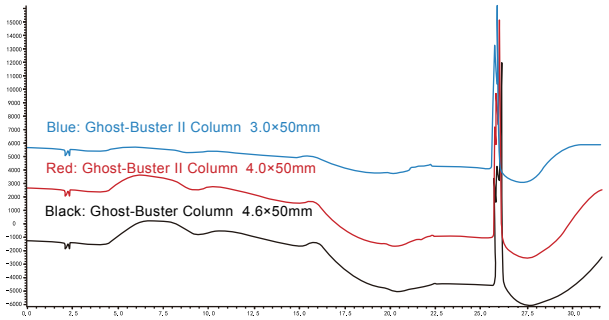
More Stable Baseline

When the initial proportion of aqueous phase is high (generally more than 95%), using conventional GB columns can remove impurities effectively. But some ghost peaks may still occur when the proportion of mobile phase has a drastic change in a few minutes or the baseline has large fluctuation. By improving the overall design of the Ghost-Buster II Column, the mobile phase is fully mixed before entering the analytical column, greatly reducing the baseline fluctuation and drift in the initial phase of the gradient program.

Column: C18 column
GB Column: Ghost-Buster II Column, 3.0×50mm
Mobile phase: A: phosphoric acid buffer B: acetonitrile
Gradient program:

Time/min	0	4	5	8	11	15
A/%	96	89	89	84	80	50
B/%	4	11	11	16	20	50

From the above case, it can be seen that Ghost-Buster II Column, 3.0×50mm is perfectly compatible with the high proportion of aqueous phase, reducing the run time of the gradient program and providing a more stable baseline.



Ordering Information

Name	P/N	Dimension	Pressure
Ghost-Buster II Column	06100-31008	4.0×50mm	40MPa
Ghost-Buster II Column	06100-31016	3.0×50mm	40MPa

Q&A

Q: What's the lifetime of GB column?

A: Not necessary. But it needs to be removed only for special circumstances like changing of peak position or ion-pair solvents mobile phase.The lifetime of GB column is related to the analysis conditions, brand of the solvents and purity of the mobile phase. If the mobile phase composition (such as water/methanol) is simple, and GB column is carefully used, the lifetime of the GB column is over one year and the number of injections is around 3000 times.

Replacement of the GB column is recommended once the trapping effect begins to deteriorate.

Q: What's the washing procedure and how frequently we have to wash the column?

GB column doesn't need special washing as the adsorption of impurities is irreversible.

Q: Is GB column compatible with ion-pair reagent mobile phases?

Whether ion pair mobile phase can be used should be determined by testing a new GB column as the sorbent in the GB column will absorb ion pair reagent.

1) In most cases, it may not be compatible with the mobile phase which contains ion pair reagent such as sodium 1 heptanesul-fonate, tetrabutylammonium hydroxide etc.

2) However, in some cases, GB column might not affect the retention and peak shape. In these cases, this GB column must be the dedicated column for this ion pair regent and can't be used for another ion pair regent mobile phase.

4. Can GB column be used for different types of mobile phases (such as potassium phosphate, sodium phosphate, ammonium acetate, TFA, Formic acid, etc.?

Yes, GB column can be used for different type of mobile phase except the mobile phase containing ammonium ion. Other reagents such as potassium phosphate, sodium phosphate, TFA, formic acid, etc. can be used for the column.

5. Is GB column compatible with 100% aqueous buffers/100 % organic solvents?

1) GB column can't be compatible with 100% aqueous buffers. At least 5%-10% of the organic phase should be contained in the mobile phase because low percentage of organic phase (←5%) might result in the unstable baseline. In this circumstance, Ghost-Buster II column, 3.0×50mm (P/N 06100-31016) is recommended.

2) GB column can be used at 100 % organic solvents.

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